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ROYAL BOTANIC GARDENS, KEW

XXXVIII—MATERIAL OF MARQUESIA ACUMINATA FROM NORTHERN RHODESIA.

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GENERAL INFORMATION RELATING TO THE SPECIES

Marquesia acuminata (Gilg) R.E. Fr. is a tree, originally referred to the genus *Monotes* by Gilg as a species well-characterised by the acuminate form of the leaves, by their only slight hairiness, and also by the many-flowered, paniculate inflorescence of larger size than is usual for the group (6 ; 7, pp. 136–7 ; 8, p. 292). The leaf-type, however, subsequently led R. E. Fries to separate the species from *Monotes*, and to associate it closely, as *Marquesia acuminata*, with *Marq. macroura* Gilg,[1] from which, according to Fries, it differs only in minor points, namely :—(1) the greatest breadth of its leaves is just below the middle, instead of near the base ; (2) the lower side of its leaves is not tomentose, but is smooth, except for sparse hairs on the principal veins ; and (3) the fruit-wings are shorter than those of *Marq. macroura*, being only 1·5 cm. in length (5, pp. 350–1). From the specimens of each species examined by the writer, however, the difference of leaf-form mentioned by Fries, does not appear to be constant and reliable ; and the length of the fruit-wings given by this author for *Marq. acuminata* also indicates a variable character, for undoubted specimens of this species collected by Captain K. R. Paterson at Matonchi Farm in Northern Rhodesia, and now in the Kew Herbarium, have fruit-wings from 2–2·5 cm. in length. The measurement given by Fries for the fruit-wings of *Marq. macroura* is from 2–3 cm.; this agrees with cases noted by the writer. On the whole, the fruit-wings of *Marq. acuminata* appear to be broad, rather than short, as compared with those of *Marq. macroura*.

Marquesia acuminata is similar to *Marq. macroura* in general habit, for it is a clear-boled tree, attaining a height of 60 feet or more ; also, the bole is buttressed, the buttresses being continued to a considerable height, although they are less deep than in the related species. Mr. Trapnell informs the writer that the tree behaves as an evergreen ; and that he has seen it apparently re-generating from seed under the shade of the parent trees and their

[1] An account of this species has been recently published in the American Journal of Botany, **22**, 723 (1935).

associates (see fig. 6). The wood, probably of the saplings produced by this regeneration, is favoured for the making of bows.

Marquesia acuminata was originally discovered by Buchner in Angola, and has subsequently been found in Northern Rhodesia. It apparently occurs in the Katanga (Belgian Congo) also ; for the habit and the flower-structure[2] of *Monotes Gilleti* De Wild. from that area indicate that this species should be transferred to the genus *Marquesia* ; while the large inflorescences and the character of the leaf-surfaces suggest at least a very close relationship with *Marq. acuminata*. Unfortunately, the imperfect leaf-tips of the Katanga specimen found by Gillet and described by De Wildeman (11, pp. 56–7), render it impossible finally to compare this particular example with *Marq. acuminata* ; and there appear to be differences in the number of lateral veins, of which there are 12 or 13 pairs in the Katanga form, as against 9 or 10 pairs in the Angolan and Northern Rhodesian specimens (see fig. 5). From extended observations in the field, however, Mr. Milne-Redhead informs the writer that he has no doubt that *Monotes Gilleti* De Wild. and *Marquesia acuminata* (Gilg) R. E. Fr. are conspecific.

In Gilg's original description of "*Monotes acuminatus*," he notes "a gland" at the base of the lamina (6) ; in the Kew specimens collected by Captain Paterson, a *pair of glands* may be distinctly seen in many cases (fig. 5) ; while De Wildeman describes, for "*Monotes Gilleti*," *glands at the base of the main vein, and in the axils of lateral veins* ; axillary glands, and also evidences of pairing at the base of the midrib, are certainly present in leaves of Gillet's specimen sent to the writer by Dr. Robyns. This is an interesting point ; for while a *single gland* on the upper surface of the lamina at the base of the midrib appears to be characteristic of the Monotoideae as a whole, there are evidently forms in both *Monotes* and *Marquesia* in which gland-number is not invariable.[3]

No details with regard to habitat were recorded by Gilg in his original account of the Angolan material of *Marq. acuminata*. Mr. C. E. Duff has reported to the writer his observation, in Northern Rhodesia, of occasional examples of the species occurring under the same conditions as *Marq. macroura*, namely, on open plains at high altitudes, and in light acidic soil. It is also recorded of Gillet's Katanga specimen ("*Monotes Gilleti*") that it was growing on sandy soil on high open land in the Pese district, the size of the tree and the quality of the wood indicating that the acidic soil-type of this

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[2] Specimens of flowers of "*Monotes Gilleti*" sent by Dr. W. Robyns, of Brussels, have shown the structure to be similar to that in *Marq. macroura*, where the 3-carpellary ovary is imperfectly divided. In species of *Monotes*, the ovary is trilocular.

[3] *Monotes glandulosissimus* Hutch. generally, though not invariably, shows extra glands in the axils of the lateral veins (*cf.* Specimen 11220, in the Herbarium of the Imperial Forestry Institute) ; and in a very similar, and probably nearly-related type, labelled "*Monotes sp.* near *Engleri*" (I.F. I. 34492), glands are developed in the vein-axils in the case of several leaves.

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PLATE X.

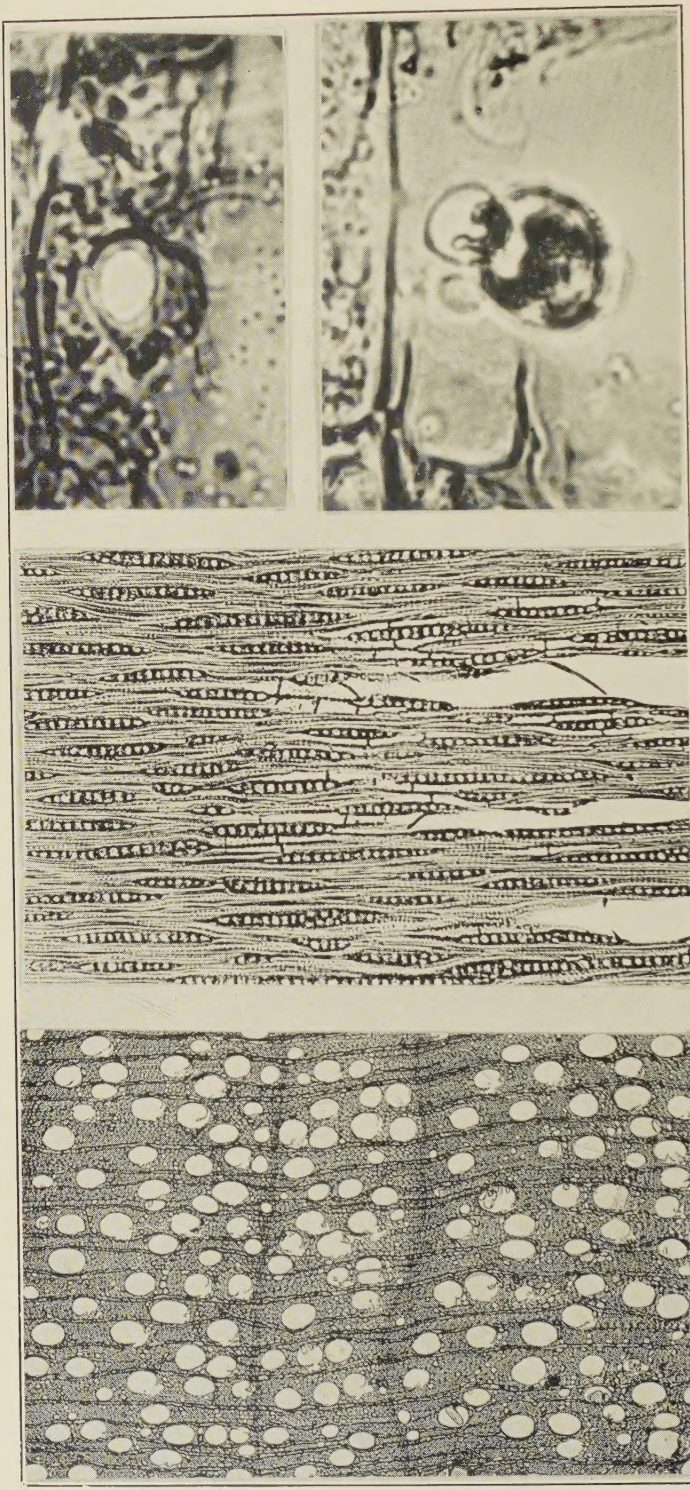

Fig. 1. Transverse section. ×40. Fig. 2. Tangential section. ×85. Figs. 3 and 4. Radial sections. ×1100.

Marquesia acuminata

area was very favourable to its development (11, p. 56). According to Mr. Trapnell's observations in Northern Rhodesia, however, *Marq. acuminata* is essentially a woodland type of high altitudes; he reports that in the Mwinilunga district, where the rainfall is from 55 to 60 inches, it occurs at an altitude of approximately 4500 feet, associated with *Cryptosepalum pseudotaxus* and *Brachystegia spp.*, typically on a pinkish or reddish brown loamy sand, marginal to the Kalahari Sand.

The Rhodesian native name for *Marquesia acuminata* is mu-Lunga (in chiLunda and chiNdembo), as reported by Mr. Trapnell, who also notes that a Kaonde native would probably use the same name as for *Marq. macroura*, that is, muSanya. Gilg, in his original description of the type (6), remarks that the Angolan natives termed it "Lungu," a name also applied to Gilg's species *Monotes caloneurus* (7, p. 136). It is interesting that Delevoy records for "*Monotes Gilleti*" the vernacular term "muSeshi," also used for *Marq. macroura* (4, p. 328); "hombo" is given by De Wildeman for the same type (11,p. 56).

Material Available for Examination.

The wood of *Marquesia acuminata* available for examination consists of a block measuring 4" x 2" transversely x 6" longitudinally, taken from very near the centre of the original trunk. The block is numbered 6881 in the Imperial Forestry Institute collection, and was sent by Mr. Duncan Stevenson from Northern Rhodesia. In the Kew Herbarium there are authenticated specimens of leaves and flowers (*Milne-Redhead* 994) of the tree from which the block was cut, and also leaves and fruits[4] (illustrated in fig. 5), collected by Captain K. R. Paterson in Northern Rhodesia; no wood specimen is available in the case of this latter herbarium material.

The Characters of the Wood.

General Properties.

Very hard, and heavy. *Weight* of air-dry wood:—54 lbs. per cubic foot. *Specific Gravity* of air-dry wood:—0·86. *Texture*: fine and close. *Grain*: somewhat indistinctly and unevenly "ribboned." *Colour*: a light brown, somewhat darker, and with a reddish tinge, in the innermost rings of the wood; sap-wood, if present in the specimen, not differentiated, unless by lighter colour. *Lustre*: slight.

Macroscopic features.

Growth rings: distinctly visible on transverse surface, and slightly visible on radial surface. Narrow (except in the case of the innermost rings), somewhat variable in width and contour. Marked by darker colour and denser appearance of the ground-mass of the wood, with fewer vessels.

[4] Fruits of the Katanga specimen are similar in type to these, but they have somewhat shorter, and considerably broader, fruit-wings (2 cm. x 0·8 cm., as against 2–2·5 cm. x 0·5 cm.).

Vessels : visible only with lens on transverse surface ; typically solitary, very numerous, evenly distributed (except for point noted above), small, fairly uniform in size, though somewhat smaller in the denser zones of the wood. Vessel-lines visible to eye on longitudinal surfaces ; individual elements visible with lens.

Ground-mass of wood : dense, individual elements not distinct, even with lens ; soft tissue not visible.

Rays : extremely fine, very numerous and closely set. Visible only with lens on transverse and radial surfaces, on the latter showing as fine streaks of darker colour than the ground-mass of the wood ; here and there the streaks are marked with fine glistening horizontal lines, representing horizontal walls of ray-cells ; rays not visible with lens on tangential surface.

Ripple marks : absent.

Secretory canals : absent ; numerous dark-coloured flecks and vertically-running streaks, however, occur in the innermost rings of this specimen, indicating the presence of resin in the tissues (see footnote 5).

Microscopic features (Plate X, Figs. 1, 2, 3 and 4).

Growth Rings.—variable in contour and emphasis ; not always clear microscopically, even when plain to the eye ; marked typically by a decrease in *number*, or even complete absence, of vessels along a band of varying width ; decrease in *size* of vessels at these points is variable and indefinite. Rings also marked by decrease in amount, or absence, of diffiuse parenchyma ; and occasionally by a very slight, very variable, compression of from 1 to 2 or 3 rows of fibres.

Vessels—*Arrangement :* scattered and fairly evenly distributed except at boundaries of growth rings ; bounded on one or both

[5] i.e., in this specimen. Attention has already been drawn to the fact that in the innermost rings of the wood-block from which the sections were cut, there are numerous dark-coloured flecks and vertically-running streaks, indicating the presence of accumulated resin in the tissues. A microscopic examination of these flecks has shown them to present abnormalities of structure which suggest the probability that they were caused by insect attack, to which the Monotoids appear to be very liable. In association with these abnormalities, there are considerable accumulations of resin in the ray-cells, vertical parenchyma and tyloses, and also a very small amount in some of the vessels and fibres. While the contents of ray-cells, parenchyma and tyloses are resinous in the normal wood of this specimen, the vessels and fibres are prevailingly without free resin or any other contents. The presence of resin in the elements, or its absence, is much more marked in unstained hand-sections cut directly from the block, than in sections of small portions of the wood which have undergone the prolonged boiling in water and preparation in hydrofluoric acid necessary for microtome sectioning.

Dr. C. R. Metcalfe reports that in a large wood specimen at Kew, apparently from the same tree as I.F.I. 6881, some of the vessels and fibres possess contents. It may, of course, be readily understood that if, for any reason, an excess of resin is produced, it may accumulate not only in the immediately active cells, but also in the neighbouring elements, either abnormal or normal. There is little doubt that the Kew specimen of *Marq. acuminata* was taken from a more resinous part of the tree, as Dr. Metcalfe suggests.

sides by rays ; generally solitary, with an occasional tendency to alignment in short oblique series ; vessel-pairs occasional ; groups of more than 2 vessels extremely rare. *Numerical distribution :* very numerous ; 42±5 solitary vessels per sq. mm., with approximately 2 per cent. of pairs. *Size :* very small to small ; tangential diameter of solitary vessels in transverse section, 53±12μ ; radial diameter, 89±26μ ; vessel elements short ; length, 445±82μ.[6] *Form of vessel-elements :* elongated and straight-sided, elliptical in transverse section ; with or without " tails " at one or both ends, though tails comparatively infrequent in this sample ; tails very variable in length and breadth, and *mainly* associated with the narrower vessel-elements, where they are sometimes long and broad as compared with the " body " of the element. *Perforations :* simple ; variable in inclination, being almost horizontal to markedly oblique. *Walls :* comparatively thin. *Pits :* mostly small and numerous, but not contiguous ; somewhat unevenly distributed ; apertures mostly very small, somewhat rounded to (generally) elliptical, or slit-like, at varying inclinations, or horizontal. Vessel-fibre pits distinguishable as being in regular, more or less vertical lines, and vessel-ray pits as being in short, horizontally-aligned groups. Pits generally clearly bordered, with whatever elements they communicate, except those communicating with marginal cells of rays (and occasionally, in the case of higher rays, with certain central body cells also) ; these are comparatively large, rounded to elliptical in shape, and appear to be only very narrowly (or scarcely) bordered. These larger " pits " very frequently suggest actual perforations (Plate X, fig. 3), the apertures appearing to have somewhat thickened rims ; occasionally, the connection between them and tylosis-formation is detectable[7] (Plate X, fig. 4). *Tyloses :* present ; developing, at least mainly, from the ray-cells (Plate I, Fig. 4) ; becoming thick-walled, and pitted ; often somewhat resinous. *Vessel-contents :* generally none.[5]

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[6] In all cases, the mean and standard deviation of 100 counts and measurements are given, as only one example of the wood is available (see Rendle and Clarke, 10, Table II, p. 36 ; also 9). The numerical standards proposed by Chattaway (3) are used in the description and measurement of microscopical features, except in the case of vessel-element length. In this instance (as in the writer's description of *Monotes Kerstingii* [1, footnote, p. 235]) the *total* length of each element, including " tails " where these are present, is considered, since, as Chalk and Chattaway have recently shown (2), this measurement probably has " phylogenetic significance through its relation to the cambial initial."

[7] These large vessel-ray pits have been found in all Monotoid species so far examined, being comparatively distinct in *radial sections* of the wood, where they are, of course, seen in *surface view* (see 1, p. 236). Owing to their minute size, and to the difficulty of cutting these very hard woods without tearing, it has been impossible to detect the apertures *in section* with any degree of certainty. They are often obscure, even in surface view, owing to the resinous contents of the ray-cells ; but they undoubtedly have a connection with the formation of tyloses by the ray-cells, both in this specimen of *Marq. acuminata*, and in a specimen (I.F.I. 4216) which is in all probability *Marq. macroura*. A similar connection between these large " pits " and tylosis-formation has now been noted in *Monotes Kerstingii*.

TRACHEIDS—none observed.

FIBRE-TRACHEIDS—typical examples somewhat wider and thinner-walled than true libriform fibres ; elongated, similar in length to the fibres, tapering and pointed at ends ; pitted throughout length generally ; pits bordered, with narrow oblique apertures. Transitions to true fibres occur.

FIBRES—*Arrangement :* forming main ground-mass of wood ; generally irregular as seen in transverse section ; occasionally a few rows at the end of a growth-ring may show a more regular, radial arrangement. Course of fibres, vertical to locally oblique and irregular ; occasionally fibres turn almost at right angles at the margin of a ray. *Shape :* variable in transverse section ; elongated, tapering gradually ; generally sharply pointed. *Length :* short ; 1·088±0·209 mm. *Walls :* thick to very thick ; not varying appreciably in early and late wood. *Lumina :* small to very small, in comparison with thickness of walls ; rounded, elliptical or slit-like in transverse section, according to outline of element. *Pits :* on all walls, and throughout length, except in the case of elements with very slender-pointed ends ; bordered, with oblique to nearly vertical slit-like apertures. *Septation :* absent. *Contents :* generally none.* (See footnote 5.)

PARENCHYMA—*Amount :* somewhat variable ; on the whole fairly abundant. *Arrangement* : *metatracheal*—diffuse, with very occasional tendency to tangential alignment in short, uniseriate rows of 3 or 4, or sometimes more, cells ; or occasionally in small groups of 3 or 4 cells ; *paratracheal*—present in small and variable amount ; never forming complete sheaths round the vessels. *Appearance of the cells : in transverse section*—somewhat variable in size, often rather large, rounded to irregular in shape ; *in longitudinal section*—fairly conspicuous in radial section, less so in tangential section ; typically in short single vertical series, in which cambiform rows are not generally obvious, though occasionally a row of 4 cells may be seen ; cells elongated vertically, though variably so ; end walls mainly horizontal. *Pits :* small, simple ; not numerous, generally obscure owing to cell-contents ; rounded to elliptical in shape ; inter-parenchyma pits (on end walls) not grouped. *Crystal bearing cells* : absent. *Cell-contents :* variably resinous.

RAYS—*Arrangement :* closely-set and very numerous, 16±1·7 per mm.; deflected by, and continguous to, vessels, or separated from them by 1 or 2, or occasionally more, series of ground-tissue elements : non-storeyed. *Shape and size :* narrowly spindle-shaped in tangential section of wood ; extremely fine ; generally uniseriate, about 14 per cent. locally biseriate, 13±3·3μ in width ; extremely low, from 2–31, frequently 11–13 cells, and 220±110μ in height. *Ray-type, and shape of ray-cells :* slightly heterogeneous ; *in transverse section*—cells generally radially elongated, though variably so, often compressed by contour of vessels ; *in tangential section*—marginal cells oval, body cells rounded or elliptical to (generally) squarish ; *in radial section*—cells generally horizontally elongated, but shorter

at ends of growth rings ; upper and lower marginal cells more variable than others. End walls of cells upright to inclined, sometimes curved. *Walls :* comparatively thick. *Pits :* simple, on all walls ; numerous on end walls ; rounded or elliptical in shape ; generally small, but much larger on walls of one or two series at upper and lower margins, and also on walls of certain central body cells of higher rays, where these are in contact with vessels. In some cases, the connection between these large pits and tylosis-formation is clearly seen. *Contents :* resinous.

Discussion.

Six authenticated species of Monotoid timbers—*Marquesia acumata* (Gilg) R. E. Fr., *Marq. macroura* Gilg, *Monotes Kerstingii* Gilg, *M. africanus* (Welw.) A. DC., *M. glaber* Sprague, and *M. tomentellus* Hutch.—and three as yet unidentified species (from Nyasaland and Tanganyika) have now been examined ; the first four species have afforded mature material, and for these, detailed calculations of size of vessels, fibres and rays, and of distribution of vessels and rays, have been made.

The timbers are remarkably uniform in physical properties and in general structure, being characterised by considerable hardness and density, a light, somewhat reddish-brown colour, slight lustre, and a lack of " patterning " : on the transverse surface, on account of the fineness of the structure and the even distribution of the vessels and parenchyma, and on the longitudinal surfaces, owing largely to the extremely low and narrow, non-storeyed rays. Secretory canals are absent, though resin occurs in the tissues. There is also uniformity in the detailed structure of the Monotoid species so far examined, the ground-mass of the wood being composed of thick-walled fibres, with only a small amount of paratracheal and diffuse metatracheal parenchyma ; the rays are very numerous, extremely fine (uniseriate, with a small and variable percentage of locally biseriate examples) and extremely low, not reaching 0·5 mm. in height ; the fibres are short, a little under or over 1 mm. in length, non-septate, and possessing small bordered pits on all walls ; the vessels are predominantly scattered and solitary, there being only a small percentage of vessel-pairs, while groups of more than two vessels are rare ; the vessel-elements are short, completely perforate, with or without " tails " at one or both ends, and the comparatively thin walls are finely pitted with non-contiguous, and generally plainly bordered pits ; there is a general tendency to the formation of thick-walled tyloses, chiefly from the marginal ray-cells, their production apparently being facilitated at these points by the presence of comparatively large vessel-ray pit-pairs.

The variations observed with regard to the foregoing features are so inconsiderable that no one of them, or combination of them, can be used diagnostically to distinguish between the various

species examined in detail.[8] There are two points, however, which at first sight might appear to offer diagnostic data : these are the numerical distribution of the vessels, and their size, in which features the greatest amount of difference between the species seems to lie.

Species	Numerical Distribution of Vessels	Size of Vessels	
		Tangential Diameter	Radial Diameter
1. *Marquesia acuminata* (Gilg) R. E. Fr. (I.F.I. 6881)	42±5 per sq. mm. Very numerous	53±12μ Very small	89±26μ to small
2. *Marquesia macroura* Gilg (I.F.I. 7981)	9±2 per sq. mm. Moderately numerous to moderately few	99±22μ Small to moderate sized	162±37μ
3. *Monotes Kerstingii* (Gilg) (Vigne 3000)	21±3 per sq. mm. Numerous to moderately numerous	61±15μ Very small to small	98±20μ
. *Monotes africanus* (Welw.) A.D.C. (I.F.I. 7980)	21±3 per sq. mm. Numerous to moderately numerous	73±15μ Small	107±26μ

Table I

In the case of the four species for which detailed calculations have been made, it will be seen from Table I that the vessels vary (1) in numerical distribution from " very numerous " (in *Marq. acuminata*) to " moderately few " (in *Marq. macroura*) ; and (2) in diameter from " very small " (in *Marq. acuminata*) to " moderate-sized " (in *Marq. macroura*).

The first point, however, presents a *tissue variation* ; and tissue variations, being apparently more intimately bound up with conditions of growth than *variations in the individual cells*, cannot be

[8] The available wood of *Monotes glaber* and of *M. tomentellus* was too immature to make comparison practicable.

Fig. 5.

a. A shoot, showing the upper surface of the leaves.

b. The lower surface of a leaf, showing the venation and the general absence of tomentum.

c. The bases of two leaves, demonstrating variation in shape.

d. The base of a leaf, showing the paired glands on the upper surface.

e. A fruit.

(*a*, *b* and *c*, slightly more than ¼ natural size; *d* slightly more than ½ natural size; *e*, slightly less than natural size).

(From a drawing by Miss Jean Dickson.)

[*To face page 567*

Fig. 6. Habit of *Marquesia acuminata*. Mature tree with younger ones beneath it.

Photo. by G. C. Trapnell.

considered as completely reliable for diagnostic purposes (*cf.* 10, p. 33). The actual size of the vessels thus remains to be examined as a possible distinguishing feature between the four species. The tangential diameter of the vessels is generally regarded as being less variable than the radial diameter, and this alone need be considered here. A glance at the means and standard deviations of this dimension for the four species (Table 1) shows a gradation from 53± 12μ in *Marq. acuminata*, to 99±22μ in *Marq. macroura*, the figure in the latter being rather outstandingly high in the series. It is clear that vessel-diameter could not safely be used to distinguish between species 1, 3 and 4 in the list ; but as a distinction between *Marq. macroura* on the one hand, and any one of the three other species on the other, it might possibly be of service. According to Rendle and Clarke, however, unless the mean sizes of an element in two species differ by not less than 3·5 times the standard deviation of the elements of either species, vessel-size should not be used diagnostically (10, p. 32) ; and calculations on this basis show that the vessel-size of *Marq. macroura* cannot reasonably be employed as a means of distinguishing between this species and any of the other three.

It therefore appears that while, *as a group*, the Monotoideae are very coherent and may be easily identified by their wood-anatomy, no one structural feature or combination of features will serve with certainty to define the various species so far examined.

In conclusion it may be noted that the evidence so far provided by wood anatomy strongly upholds Gilg's opinion, drawn from floral and various vegetative characters, that the Monotoideae should be included in the Dipterocarpaceae, rather than in the Tiliaceae (7) ; this point is discussed in some detail elsewhere. [9]

The writer wishes to express her very grateful thanks to the Director of the Royal Botanic Gardens, Kew, Dr. W. Robyns of Brussels, Dr. J. Burtt Davy, and Mr. Duncan Stevenson, for their very kind co-operation in the obtaining and authenticating of the material here described ; to Mr. E. W. B. H. Milne-Redhead, Mr. C. G. Trapnell, and Mr. C. E. Duff, for field-notes ; to Dr. C. R. Metcalfe, for information concerning the Kew wood-specimen of *Marquesia acuminata* ; to Professor R. S. Troup, for permission to work in the Imperial Forestry Institute, and to the Christopher Welch Trustees and the British Association, for grants without which it would not be possible to carry out these researches ; and to Miss Jean Dickson, Mr. C. G. Trapnell and Mr. A. L. Clinkard, for the drawing and photographs used in illustration of this paper.

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XXXIX—NEW OR NOTEWORTHY SOUTH AFRICAN PLANTS.*—VII. J. Burtt Davy.

Rubiaceae.

121. **Canthium foliosum** *Burtt Davy*, comb. nov. *Plectronia foliosa* Burtt Davy in Kew Bull. 1921, 191.

Transvaal. Waterberg District: at Warm Baths, c. 1080 m., *Burtt Davy* 5161 in Bolus herb. (type).

122. **Canthium Junodii** *Burtt Davy*, comb. nov. *Plectronia Junodii* Burtt Davy in Kew Bull. 1921, 192.

Transvaal. Pietersburg District: Shilouvane, "ravin du Masetane," *Junod* 720 in Kew herb. (type). Extends through Mozambique Territory to Nyasaland.

123. **Canthium ovatum** *Burtt Davy*, comb. nov. *Plectronia ovata* Burtt Davy in Kew Bull. 1921, 191.

Transvaal. Barberton District: near Barberton, *Legge* 1729 in Bolus herb. (type); *Legge* 1728 in National herb. Pretoria.

Compositae.

124. **Coreopsis Schlechteri** *Burtt Davy*, comb. nov. *Bidens Schlechteri* Sherff in Bot. Gaz. **76**, 146 (1923).

Transvaal. Pietersburg District: Houtboschberg, *Schlechter* 4745 (type). Also in the Barberton District.

* Continued from K.B. 1924, 235.

125. **Gynura picridifolia** *Burtt Davy*, sp. nov. ; *Senecio picridifolius* Harv. in Fl. Cap. **3**, 379 *partim*, non DC. ; affinis *S. picridifolio* DC., sed styli ramis appendiculatis, caule foliisque glabrioribus differt.

Folia anguste lanceolata, acuta vel acuminata, late repando-dentata vel lobulata, superiora sessilia, distincte auriculata. *Capitula* pauca longipedunculata ; corolla flava.

Transvaal. Pretoria District : Groenkloof, near Pretoria, along water-furrow, *Burtt Davy* 18809 in Kew herb.

Also in the eastern Cape Province, Natal, Lourenço Marques Province (Portuguese East Africa), S. Rhodesia, Katanga Province (Belgian Congo), and Uganda.

This plant superficially resembles *Senecio picridifolius* DC., differing, however, in the appendages to the style-arms and in being less scaberulous. In describing the plants which he referred to *Senecio picridifolius* DC., Harvey observed that " the natural affinities of this species are to me very doubtful " ; it has been found necessary to refer all of the specimens cited by him, excepting the type, to the genus *Gynura*.

126. **Kleinia barbertonica** *Burtt Davy*, comb. nov. *Senecio barbertonicus* Klatt in Bull. Herb. Boiss. **4**, 840 (1896). *Senecio Gilgianus* Muschl. in Engl. Bot. Jahrb. **43**, 62 (1909).

Transvaal. Barberton District : Highland Creek, near Barberton, *Galpin* 1000 (type). Also in Southern Rhodesia, near Bulawayo, *Eyles* 1239 (type of *S. Gilgianus* Muschl.).

127. **Euryops laxus** *Burtt Davy*, comb. nov. *Gamolepis laxa* Harv. in Harv. and Sond. Fl. Cap. **3**, 158 (1865).

Natal. Zululand : without precise locality, *Gerrard* 1015 (type). Also in the Transvaal, Orange Free State, and Griqualand East.

This species clearly connects *Euryops* with *Gamolepis*. Some flowering specimens show a distinct pappus ; in others this is rudimentary, or deciduous or absent. In the type specimens the achenes are too old to show pappus.

128. **Cotula microcephala** *DC.* var. **pilosa** *Burtt Davy*, comb. nov. *C. anthemoides* var. *pilosa* Harv. in Harv. and Sond. Fl. Cap. **3**, 182 (1865). *C. anthemoides* Willd. non Linn.

Cape Province. Beaufort West Division : between Beaufort West and Rhinosterkop, *Drège*. Also in the Transvaal.

The typical form (*C. microcephala* DC. ; *C. anthemoides* var. *glabriuscula* Harv.) ranges from the Cape Province to Angola and Abyssinia.

129. **Aster luteus** *Hutchinson*, comb. nov. *Felicia lutea* N.E. Brown in Kew Bull. 1901, 123. *Detris ericifolia* var. ? *anthemoides* Hiern, Cat. Pl. Welw. **1**, pt. 3, 546 (1898).

Natal. Zululand: Amatikulu, below 1000 ft. alt., *Wylie in herb. Wood* 7592 (type).

Angola. Mossamedes: on damp sands along banks of river Bero, abundant, *Welwitsch* 3435 (type of *D. ericifolia* var. ? *anthemoides*).

130. **Aster Harveyanus** *O. Ktze.* Rev. Gen. 316 (1891). *Diplopappus serrulatus* Harv. in Harv. and Sond. Fl. Cap. **3,** 86 (1865) (not *Aster serrulatus* Harv.). *Aster xylophyllus* Klatt in Bull. Herb. Boiss. **4,** 831 (1896), and *A. serrulatus* var. *xylophyllus* Klatt in Bull. Herb. Boiss. **6,** 562 (1898).

Transvaal. Pretoria District: at the Magaliesberg, *Burke* sine numero, *Zeyher* 800 (types); Barberton District: hillside at Barberton, 2850 ft., Sept. 1890, *Galpin* 1032 (type of *A. xylophyllus*). Also in Natal.

131. **Aster pleiocephalus** *Hutchinson*, sp. nov. *Diplopappus asper* var. *pleiocephalus* Harv. in Harv. and Sond. Fl. Cap. **3,** 85 (1865); ab *A. aspero* Less. capitulis corymbosis, involucri bracteis glabris differt.

Herba perennis usque ad 0·75 m. alta; caules strigoso-pilosi. *Folia* linearia, integra vel pauci-dentata, 4–6 cm. longa, usque ad 8 mm. lata triplinervia, utrinque pilis basi bulbosis parce strigosa. *Capitula* pauca, laxe corymbosa, depresso-globosa, circiter 1·5 cm. diametro (radiis exclusis); pedunculi graciles. *Involucri bracteae* 3–4-seriatae, lineares, acutae, glabrae, margine brevissime ciliolatae. *Flores radii* albi, disci flavi. *Achaenia* pubescentia, pappo pallide stramineo coronata.

Natal. Klip River County: near Ladysmith; Umvoti County: Greytown, *Gerrard* and *McKen* 340 and 1009 (types). Also in Zululand, the Transvaal, Orange Free State, and Griqualand East.

132. **Philyrophyllum alatum** *Burtt Davy*, comb. nov. *Pentatrichia alata* S. Moore in Journ. Bot. **55,** 106 (1917).

Transvaal. Lydenburg District: Pilgrim's Rest, *Rogers* 18667 (type).

133. **Inula paniculata** *Burtt Davy*, comb. nov. *Monactinocephalus paniculatus* Klatt in Bull. Herb. Boiss. **4,** 474 (1896).

Transvaal. Pietersburg District: Houtboschberg, *Rehmann* 6068 (type of Klatt's genus and species). Also in Southern Rhodesia.

134. **Helichrysum declinatum** *Less.* Syn. Gen. Comp. 278 (1832). *Amphidoxa gnaphalodes* DC. Prodr. **6,** 246 (1837). *Gnaphalium micranthum* Thunb. Prodr. Pl. Cap. 149 (fide Moeser: non *Helichrysum micranthum* A. Cunn.).

TRANSVAAL. Widely distributed from the Drakensberg to the Bechuanaland border. Also in Natal, the Cape Province, British Bechuanaland, the Bechuanaland Protectorate, Southern Rhodesia, Kenya Colony, and Uganda.

135. **Berkheya echinacea** *Burtt Davy*, comb. nov. *Stobaea echinacea* Harv. in Harv. and Sond. Fl. Cap. **3,** 495 (1865). *S. Gerrardii* Harv. l.c.

NATAL. Zululand: dry plains, without precise locality, *Gerrard and McKen* 1045 (type); Emyati, *Gerrard and McKen* 1046 (type of *S. Gerrardii*).

TRANSVAAL. Common on grassy slopes of the Highveld and eastern mountains.

136. **Berkheya rhapontica** *Hutch. et Burtt Davy*, comb. nov. *Stobaea rhapontica* DC. Prodr. **6,** 519 (1837); Harv. in Harv. and Sond. Fl. Cap. **3,** 494 (1865).

NATAL. Durban County: Port Natal, *Drège* sine numero (type). Also in Swaziland, the Orange Free State, and eastern districts of the Cape Province.

137. **Berkheya Radula** *Burtt Davy*, comb. nov. *Stobaea Radula* Harv. in Harv. and Sond. Fl. Cap. **3,** 491 (1865). *Berkheya Adlamii* Hook.f. in Bot. Mag. t. 7514 (1897).

TRANSVAAL. Pretoria District: Magaliesberg, *Burke* sine numero, *Zeyher* 981 (twin types). Also in Griqualand West, and Southern Rhodesia.

138. **Berkheya onopordifolia** *Burtt Davy*, comb. nov. *Stobaea onopordifolia* DC. Prodr. **6,** 521 (1837).

CAPE PROVINCE. Zwartberg, Stormberg, and Wittebergen, *Drège* sine numero (types). Also on the Transvaal High-veld and in the Orange Free State.

139. **Berkheyopsis linearifolia** *Burtt Davy*, comb. nov. *Gazania linearifolia* Bolus in Trans. S. Afr. Phil. Soc. **16,** 395 (1906).

TRANSVAAL. Lydenburg District: Belfast, *Bolus* 12067 (type).

140. **Berkheyopsis bechuanensis** *S. Moore* in Journ. of Bot. **51,** 185 (1913). *B. Rehmannii* Thell. in Vierteljahrsschr. Nat. Ges. Zürich, **61,** 461 (1916).

BECHUANALAND PROTECTORATE: near Magalapye, *Rogers* 6106 (type). Also in Southern Rhodesia.

TRANSVAAL. Waterberg District: Elands River near Klippan, and at Streydpoort, *Rehmann* 4962, 5078 and 5453 (types of *B. Rehmannii* Thell.).

Some of the Transvaal material has been referred to *B. Kuntzei* O. Hoffm. but that species is described as having the leaves glandular-pilose beneath, which does not apply to our plant.

141. **Gazania pygmaea** *Sond.* in Linnaea **23,** 69 (1850). *G. canescens* Harv. in Harv. and Sond. Fl. Cap. **3,** 478 (1865).

Transvaal. Pretoria District: Magaliesberg, *Burke* and *Zeyher* sine numero (types).

Orange Free State: *Cooper* 719 (type of *G. canescens* Harv.). Also in Natal, the eastern districts of the Cape Province, British Bechuanaland, Southern Rhodesia, Angola, Portuguese E. Africa, and Nyasaland.

After studying a large series of specimens it appears that the Transvaal material, which has been variously referred to *Gazania serrulata* DC., *G. longifolia* Less., *G. longiscapa* DC., and *G. Krebsiana* Less., represents but a single, somewhat variable species. Both glabrous and hispid leaves are found on the same plant (e.g. *Burke's* type; *Bolus* 7825 and 10907, and *Galpin* 975). So also, heads with outer involucral bracts shorter than, or longer than, the inner, are found on the same plant.

This is an ornamental, dwarf species, showing considerable range in size and colour of flowers; it is quite worth cultivation. It stands fairly severe frosts, though as these occur in the long dry season it is uncertain whether it would tolerate wet cold. There is a handsome form with yellow flowers, and dark spots at base of the ligules (var. *maculata* N.E. Brown).

XL—CONTRIBUTIONS TO THE FLORA OF BURMA: XII*—C. E. C. Fischer.

N.B.—The regions shown within brackets are those whence the species has been previously reported.

Schisandra axillaris *Hook.f. et T.* [Magnoliaceae].

(Khasia Hills.)

Maymyo District: Singaungle, fls. Aug., *Ba Pe* per *C. E. Parkinson* 12176.

Alphonsea glabrifolia *Craib* [Annonaceae].

(Siam.)

Maymyo District: Gokteik viaduct, *Po Khant* per *C. E. Parkinson* 12435.

Goniothalamus burmanicus *C. E. C. Fischer,* sp. nov. [Annonaceae]: a *G. macrantho* (Kurz) Boerl. ramulis hornotinis pubescentibus, foliorum longiorum costa supra pubescente, pedicellis brevioribus, sepalis brevioribus erectis adpresse strigosis, petalis interioribus majoribus distinctus.

A shrub 2 m. high; branchlets terete, brown, bark reticulately rugulose; youngest twigs adpressed chocolate-brown pubescent. *Leaves* oblong, elliptic-oblong or lanceolate-oblong, acute or acuminate, narrowed to the rounded base, 14–32 cm. long, 4·5–8 cm. wide, midrib deeply impressed and pubescent above, prominent below, primary nerves 14–25 pairs, regular, ascending, slightly curved and

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* Continued from K. B. 1933, 366.

anastomosing near the margins, secondary nerves more or less regularly scalariform between the primaries, brown when dry, somewhat glaucous below and more or less puberulous on the midrib and nerves. *Petioles* terete, 7–12 mm. long, brown-puberulous. *Flowers*, long, solitary, supra-axillary, white. *Pedicel* thick, 4–4·5 mm. long, densely adpressed brown-strigose ; bract at its base shorter, lanceolate, brown-strigose. *Sepals* 3, erect, thickly coriaceous, ovate, subacute, more or less keeled, 8 mm. long, adpressed brown-strigose. *Petals* 6 : 3 outer free, thinly coriaceous, linear-lanceolate, obtuse, 5–6·5 cm. long, 8–9 mm. wide at the base, thinly puberulous on both sides, pustulate at the base outside, midrib prominent outside ; 3 inner thickly coriaceous, lanceolate, subacute, base narrowed and rounded, 2·2–2·8 cm. long, valvate and firmly cohering in the upper half, separated below by a large triangular hiatus, puberulous, pustulate at the base outside. *Torus* truncately conical, 2·5 mm. high, shortly brown-hairy at the apex. *Stamens* densely packed 1·7–2 mm. long, narrowly obcuneate, apex flat, connective concealing the anthers. *Ovaries* about 12, linear, 2·2 mm. long, densely brown-hairy ; ovule solitary, erect from the base, subcircular, flat ; style 2 mm. long, terete, slightly widened to the rounded apex, rather wider than the ovary, usually curved, yellowish-brown (when dry), minutely papillose.

North Toungoo District, East Swa Reserve, fls. May, *Maung Ba Pe* per *C. E. Parkinson* 8544.

Garcinia paniculata *Roxb.* [Guttiferae].

(Bhutan and Khasia Hills.)

Sandoway District : Arakan Yoma, fls. white, Jan., *Ba Pe* per *C. E. Parkinson* 11938. Tree 60 ft. high.

Hibiscus grewiaefolius *Hassk.* [Malvaceae].

(Malaya.)

Mergui District : Tenasserim, Sindin, 50 ft. fls. bright-yellow turning purplish red after falling, Nov., *Sukoe* per *C. E. Parkinson* 10148 ; Tharabwin, 50 ft., *Sukoe* per *C. E. Parkinson* 10162 ; Tharabwin chaung-pya, frt. green, Feb., *Po Khant* per *C. E. Parkinson* 11308. Vern. names : *thit-sho, bawthane, bawthanaw.*

Desmodium reticulatum *Champ.* [Papilionaceae].

(W. China.)

N. Toungoo, Kunmyaung Saing, Yoma Reserve frt. Nov., *Ba Pe* per *C. E. Parkinson* 8282. 18 in. high.

Mastixia arborea *C. B. Clarke* [Cornaceae].

(Cachar, S. India, Ceylon, Siam.)

Myitkyina District, Mawhan, fls. light-yellow, May, *Ba Pe* per *C. E. Parkinson* 12141.

Vernonia hyalina *C. E. C. Fischer* [Compositae] published in K.B. 1927, 91 is **Microglossa volubilis** *A.DC.*

Androsace Gagnepainiana *Hand.-Mazz.* [Primulaceae].

(Assam, Yunnan.)

Seinghku Wang, 28° 8′ N, 97° 24′ E, 13,000 ft., fls. white, sometimes with a pink, sometimes with a green eye, or faintly pink with a yellow eye, July, *F. Kingdon Ward* 6843, " on mossy boulders in open meadows " ; *F. Kingdon Ward* 7025, " on grassy ledges of granite cliffs " ; *F. Kingdon Ward* 7082, " on meadow-clad slopes at the foot of granite cliffs."

Scolopia Kermodei *C. E. C. Fischer*, sp. nov. [Flacourtiaceae] ; *S. spinosae* Warb. affinis, ramulis inflorescentiisque glabris, pedicellis infra medium articulatis, floribus majoribus differt.

A glabrous *tree* up to 80 ft. tall (fide Maung Kan) ; main stem thorny ; branchlets greyish-brown, shallowly furrowed ; twigs reddish-brown, lenticellate, glabrous. *Leaves* thinly coriaceous, broadly ovate to obovate or elliptic-lanceolate, acute or acutely long-acuminate, rarely rounded, base usually acute, sometimes rounded, shining, 7–19 cm. long, 3–6·8 cm. wide, base subtriplinerved, secondary nerves 7–12, slender, reticulations fine on both faces, midrib, nerves and reticulations slightly raised below ; petioles 8–18 mm. long, shallowly channelled above, more or less rugulose, bearing a small rounded gland on either side at the apex. *Racemes* axillary ; rhachis not very slender, up to 10 cm. long, glabrous, often drying black ; pedicels 7–15 mm. long, glabrous, articulate a little above the base, subtended by a linear-ensiform, acute, glabrous, shortly ciliate bract which usually overtops the joint. *Sepals* 6–8, broadly ovate to subcircular, glabrous, fleshy except the ciliolate margins, 2–3 mm. long. *Petals* 6–8, oblong, rounded, glabrous, fleshy except the ciliolate margins, 1·9–2·5 mm. long. *Disc* cushion-shaped, rather thick, 4·5–5 mm. diam., shortly hairy. *Stamens* very numerous ; filaments filiform, 4–7 mm. long ; anthers oblong, 1 mm. long. *Ovary* ellipsoid, glabrous, 3·5–4·3 mm; long, 1-celled with 4 parietal placentae, ovules many, subdiscoid . style columnar, about as long as the ovary, apex 4-lobed or more or less deeply 4-fid. *Fruit* (hardly ripe) obovoid, tipped by the persistent style, 1·5–2 cm. long ; seeds 3–4, flat.

Bassein District : Ridge-top East of Kanazogon Village, West Coast, 500 ft. fls. Jan., *C. W. D. Kermode* 7109 (type in Kew Herb.) : " tree 30 ft. high with white flowers, vernacular name " *thabye* " ; near Simma village, 100 ft., *C. W. D. Kermode* 7128 ; Kanyin Chaung, 50 ft., *Maung Kan* 7001, vernacular name " *kyettet* " ; Kalayaung, fls. white Feb., *C. E. Parkinson* 8803, " tree 25 ft. high by the sea-shore." Myaungnya District : Lebzauk Reserve, frt. March, *J. H. Lace* 2987. Insein District : Rangoon, fls. March, *R. N. Parker* 2778, " small tree with thorns on the main stem." North Hlaing Yo Ma Reserve, *Ba Pe* 11623. North Toungoo

District : Sa Mo Reserve, *Ba Pe* 9366. Andaman Islands : Bamboo flat, Port Blair, fls. March, *C. E. Parkinson* 419 ; Rutland Island, fls. Jan., *C. E. Parkinson* 874 ; Weinkedleygung, fls. Feb., *C. E. Parkinson* 902 (a).

At first it was thought that this must be Kurz's *Scolopia lucida* published in the Forest Flora of British Burma, **1**, 73, as the fruit seemed to agree with Kurz's description, but comparison with Kurz's type sheet (by the courtesy of the Director of the Botanical Gardens at Sibpur) which bears the Wall. Cat. No. 7245 (of which a more complete sheet is in the Wallich Herbarium at Kew), showed that the two are distinct. The Wallichian sheets are devoid of flowers ; the leaves resemble those of *S. spinosa* Ward. and the fruit stalks show a remainder of indumentum resembling that of the same species. In view of the shape of the fruit, however, I hesitate to unite the two. There is no mention whatever of *S. lucida* Kurz in the Fl. Br. Ind. so that Hooker's opinion on the question is not known.

Adhatoda oreophila (*Justicia oreophila* C. B. Clarke) *C. E. C. Fischer*, comb. nov., var. **magna** *C. E. C. Fischer*, var. nov. [Acanthaceae] ; a typo foliis majoribus minus pubescentibus, bracteis densioribus multo majoribus differt.

Shrub 1 m. high, terminal twigs 2-edged by decurrent ridges from the petioles, more or less 4-ribbed, adpressed puberulous. *Leaves* elliptic, abruptly acuminate at both ends, decurrent on the petioles, 10-24 cm. long, 4·5-12 cm. wide, midrib slightly raised on both faces, primary nerves 10-13 pairs, very regular, arising from the midrib at an angle of 60-72°, arching evenly upwards, anastomosing near the subundulate margins, puberulous on both faces ; petioles 2-4·5 cm. long, adpressed puberulous. *Peduncles* axillary, 5-6·5 cm. long, obtusely 4-ribbed, adpressed puberulous. *Spikes* dense, 6-9 cm. long, about 3 cm. wide. *Bracts* more or less 4-ranked, broadly falcate to rotund-ovate, subacute, 2-3·5 cm. long, 1·2-2·2 cm. wide, 5-nerved from the base, the 2 outer rather faint, reticulate between ; pubescent and puncticulate on both faces, 1-flowered. *Bracteoles* oblanceolate-spathulate, obtuse, narrowed into a short broad petiole ; nearly as long as the bract, 5 mm. wide, venation, pubescence and dotting as of the bracts. *Calyx* 6-6·5 mm. long, divided nearly to the base into 5 subequal, narrowly lanceolate, acuminate, 3-nerved segments, pubescent and puncticulate like the bracts. *Corolla* nearly concealed by the bract and bracteoles, 1·6 cm. long, pubescent without, white with maroon streaks in the throat ; tube 7·5 mm. long ; limb deeply 2-lipped ; upper lip oblong, slightly concave, notched at the apex ; lower lip deeply 3-lobed, median lobe broadly oblong, rounded, lateral oblanceolate, obtuse. *Stamens* : *filaments* subulate, thick, hollow, 9-10 mm. long, bases and 2 adjacent ribs on the corolla tube hispid ; *anthers* linear-oblong, 4 mm. long, base divaricate, acute but not spurred, polliniferous throughout. *Disc* annular, thin, 1·25 mm. deep. *Ovary* ovoid, compressed, 2·5 mm. long, hispidulous at the apex ; *ovules* 2 in each

cell; *style* filiform, slightly thickened upwards, 1·25 cm. long, hispidulous at the base. *Capsule* clavate, laterally compressed, obtusely shortly beaked, 1·75 cm. long, base hollow but empty, hispidulous at the apex. *Seeds* 2–4, rotund-ovate, flat, 5–6 mm. long, pale, glabrous, reticulately rugose.

Maymyo Plateau, Gokteik, 2300 ft., fls. & frt. Sept., *C. E. Parkinson* 11223 (type in Herb. Kew.).

C. B. Clarke's description of *Justicia oreophila* in Fl. Brit. Ind **4,** 526 is based on a single sheet collected in Chittagong by J. D. Hooker and T. Thomson. On the original label it is determined as *Adhatoda ventricosa* Nees. It will be observed that the description makes no mention of the corolla or stamens and a reference to the specimen reveals that these had all fallen off. It differs from Parkinson's specimen, described rather fully above because the original description is very restricted, only in the characters mentioned in the diagnosis. I have no doubt therefore that were anthers available they would show that the plant is an *Adhatoda* and not a *Justicia*, and I do not hesitate to transfer it to the first named genus.

XLI—MISCELLANEOUS NOTES.

H. Bruins-Lich.—Mr. H. Bruins-Lich, who left Kew in 1928 and has been successively Horticultural Officer at St. Helena and Curator of the Botanic Gardens at Trinidad, has been appointed Assistant Superintendent of Parks and Sports Fields at Pretoria, South Africa.

Dr. Marshall A. Howe.—We learn with interest that the Board of Directors of the New York Botanical Garden has elected Dr. Marshall A. Howe, Ph.D., D.Sc., to succeed Dr. Elmer D. Merrill as Director-in-Chief of the New York Botanical Garden, as from October 1st, 1935. Dr. Howe has been associated with the New York Garden for thirty-four years and has held the position of Assistant-Director for the past twelve years. He is well known to botanists by his algological researches and to horticulturists by his work on dahlias, irises and paeonies.

Dr. H. A. Gleason has been appointed Deputy-Director, and Mr. Henry de la Montagne, Junr., who has been Business Manager of the New York Botanical Garden since 1930, is to succeed Dr. Marshall Howe as Assistant-Director.

F. A. F. C. Went.—We record with great regret the death of Prof. F. A. F. C. Went, For.-Mem. Roy. Soc., F.L.S., Professor of Botany and Director of the Botanic Garden at Utrecht, on July 24th, at Wassenaar, near The Hague. Prof. Went was born at Amsterdam on June 18th, 1863. His early botanical training was received under Hugo de Vries and later he worked at Bonn under Stras-

burger and at Paris under Van Tieghem. Between 1891 and 1896 he was Director of the West Java Sugar Experimental Station where he carried out a wide range of researches, mainly on the physiology and pathology of the sugar cane. He was appointed Professor of Botany at Utrecht in 1896.

Prof. Went possessed to an unusual degree the power, whilst engaged in specialized investigations, of retaining a broad outlook on other branches of botany, and of seeing his own subject in relation to other spheres of knowledge. His best-known work was concerned with plant physiology and pathology, but the wide range of his interests can be seen from the fact that, besides publishing, in conjunction with Dr. J. H. Walker, a book on the diseases of sugar cane (1898) and papers on the morphology of *Castilloa elastica* (1896) and *Sciaphila nana* (1909), and on the influence of external conditions on the flowering of *Dendrobium crumenatum* (1915), he also worked on the anatomy and geographical distribution of the *Podostemonaceae* and published two papers on this family in 1924 and 1928. His articles on non-botanical subjects include one dealing with life in Dutch universities (1926).

Some of his physiological papers are concerned with respiration, photosynthesis, and protoplasmic streaming, but his chief interest of recent years was in tropisms and growth. During the last ten years he built up a new conception of the mechanism of plant-growth, which he showed is controlled by a substance (auxin) present in the tips of the coleoptiles of oats and other grasses. He published an excellent summary of this work in English in 1935 (Biological Reviews, **10**, 187).

Prof. Went was elected a Foreign Member of the Linnean Society of London, in 1931, and of the Royal Society in 1933. He was a Vice President of the International Botanical Congress held at Cambridge in 1930 when the Honorary Degree of Sc.D. was conferred upon him. His death just before the holding of the Sixth International Botanical Congress at Amsterdam, over which he was to have presided, was deeply deplored, and many tributes were paid to his memory there by botanists gathered from all all parts of the world.

B. L. Robinson.—We record with deep regret the death, in his seventy-first year, of Dr. Benjamin Lincoln Robinson, Asa Gray Professor of Systematic Botany and for forty-three years Curator of the Gray Herbarium at Harvard University. Dr. Robinson, who succeeded Sereno Watson in 1892, ably maintained and materially improved the position of this great Herbarium. He edited the continuation of Asa Gray's "Synoptical Flora of North America"; produced, in collaboration with Prof. M. L. Fernald, Gray's "New Manual of Botany," which was an illustrated seventh edition of the famous Manual; and was the editor of "Rhodora" for the first thirty years of the life of this publication.

As a taxonomist, Robinson was the most conspicuous figure among the numerous North American botanists who have been attracted by the *Compositae*. He monographed such genera as *Brickellia, Verbesina, Porophyllum, Melampodium, Nocca* and *Rumfordia,* and was associated with Dr. J. M. Greenman in similar revisions of numerous other genera, for example, *Sabazia, Tridax* and the Mexican and Central American species of *Hieracium.* These papers usually appeared in the " Proceedings of the American Academy of Arts and Sciences " and were reprinted in the " Contributions from the Gray Herbarium." Of late years Robinson had concentrated on the *Eupatorieae,* and this vast and critical group occupied his attention until his death. Numerous invaluable papers were published, among which special mention must be made of his " Key to the Genera of the *Compositae—Eupatorieae* " (1913), and his series of revisions of the *Eupatoria, Mikaniae* and *Steviae* of Venezuela, Colombia, Ecuador, Peru and Bolivia. He was gradually preparing a " General Treatment of the Eupatorieae," and even a botanist who never met or saw him could tell from the neatness of his annotations and the care with which he sought to interpret the historic types at Kew that no pains were being spared to complete a work of monumental accuracy and thoroughness.

Robinson's great interest in the flora of Mexico and Central America led him to describe many new species belonging to other families. He also undertook in 1902, as a result of the Hopkins-Stanford expedition, an important recension of the Flora of the Galapagos Islands which was published in Proc. Amer. Acad. vol. 38. This included a bibliography, tables of distribution, and notes on the composition and affinities of the flora, and was a distinguished contribution to the botanical history of the archipelago.

Though Robinson's main interests undoubtedly lay in systematic botany, he found time to study the development of the modern novel, which he read rather as an intellectual pursuit than as a recreation. With his passing, yet another link with the pre-Vienna generation of North American botanists has been broken, and a great and scholarly gentleman has gone to his rest.

The valid publication of the combination Lilium Duchartrei var. Farreri.—This combination having been attributed by some botanists to A. Grove (1925) and by others to K. Krause in Notizbl. Bot. Gart. Berlin, **9,** 534 (1926), the question of the correct authority has been referred to the writer for investigation. Those who accepted the later date and author seem to have done so on the ground that the original publication of the combination in 1925 was invalid. It is true that *Lilium Duchartrei* var. *Farreri* A. Grove in Gard. Chron. ser. 3, **78,** 69 (1925) was not accompanied by a technical description or by an actual mention of the synonym on which (as will be seen below) it was based, but to those who had

read the various articles and notices concerning *Lilium Farreri* which had appeared in the Gardeners' Chronicle fron 1919 onwards, no doubt could arise that *L. Duchartrei* var. *Farreri* A. Grove was intended by its author as a new name for *L. Farreri*. The chief places of mention of *L. Farreri* in Gard. Chron. were in vol. **66,** 76 (1919) ; **67,** 281, 284, fig. 133 (1920) ; **76,** 33, 61, fig. 22 (1924).

The rules of botanical nomenclature, however, are concerned with actual facts of publication, not with suppositions, however probable these may seem, and it is therefore fortunate that Grove, when publishing *Lilium Duchartrei* var. *Farreri* gave a reference—to Gard. Chron. July 30, 1921, p. 63—in which the following sentence occurs : " With ample material to hand for comparison, it is possible that further consideration may prove the specific position of the plant as *L. Farreri* to be untenable, but whether it retains that name or is reduced to *L. Duchartrei*, there can be no doubt horticulture is indebted to Farrer for a good garden Lily of dwarf habit."

The combination *L. Duchartrei* var. *Farreri* was therefore validly published by Grove in 1925, by means of *indirect citation of the synonym concerned*, namely, *L. Farreri*. A parallel case is discussed in Kew Bull. 1934, 136.

It should be emphasized that the present note is concerned solely with nomenclature, no opinion being expressed as to the taxonomic status of *L. Farreri*.

T. A. SPRAGUE.

Aconitum Nagarum Stapf and A. venatorium Diels.—In my note " On the Identity of *Aconitum acaule* Diels " (K.B. 1932, 241), I referred to *A. venatorium* Diels as " certainly distinct from any previously described species." Recent examination of the Indian species has shown that this statement is erroneous, for *A. venatorium* has been found to be identical with *A. Nagarum* Stapf, one of the two species described by Stapf from imperfect material and relegated in his monograph to the end of the genus. *A. venatorium* and its variety (K.B. 1932, 244–5) must therefore now receive the following nomenclature :

Aconitum Nagarum *Stapf* in Ann. Roy. Bot. Gard. Calc. **10** (2), 176 (1905).

A. ferox C. B. Clarke in Journ. Linn. Soc. **25,** 3 (1890), *non* Wall. ex Séringe.

A. venatorium Diels in Notes Roy. Bot. Gard. Edinb. **5,** 269 (1912); Airy-Shaw in Kew Bull. 1932, 244.

var. **ecalcaratum** (*Airy-Shaw*) *Airy-Shaw*, comb. nov.

A. venatorium var. *ecalcaratum* Airy-Shaw in Kew Bull. 1932, 245.

The affinity of *A. Nagarum* is evidently with *A. deinorrhizum*

Stapf and *A. Balfourii* Stapf (subgen. *Tuberaconitum* sect. *Bisma* subsect. *Deinorrhizum* Rapaics), of which it has the habit and homotrichous indumentum.

H. K. AIRY-SHAW.

Biography of John Briquet.*—Soon after the death of Dr. John Briquet in 1931, many notices of his scientific work were published. In this biography, written by his daughter, Briquet's life is viewed from quite a different standpoint. To quote the words of Madame Briquet in a letter recently received—" My daughter . . . wanted to give our family and his many friends at home and abroad a last souvenir of what he had been, not only in science but also in many other directions."

The book contains seven chapters covering the childhood and youth of Briquet ; Briquet as a botanist in Geneva ; Briquet and botanical nomenclature ; Briquet as a traveller ; as a soldier ; his honours and personal qualities ; and finally appreciations of his life and works.

In addition the author has included a list of his botanical works classified in a very useful way : (1) monographic works, (2) works relating specially, or very largely, to the flora of France, (3) morphological, anatomical and biological works. A list, compiled by M. F. Cavillier, of genera and species and subdivisions of species named in honour of Briquet is added. This biography will be greatly valued by all botanists, especially by those who were privileged to know the late Dr. Briquet.

M. L. GREEN.

Chronica Botanica.†—The need for a comprehensive year book of botany has been admirably met by the publication last May of volume 1 of this work. The book is strongly bound and is divided into three sections distinguished by the colour of the cut edges of the leaves, yellow, red, and blue, respectively. The first section includes an introduction on " International Co-operation among Botanists " by Dr. E. D. Merrill, the programme of the Amsterdam Congress, 1935, with portraits of the officers, a " Short History of the International Botanical Congresses " by Dr. A. B. Rendle (pp. 35–40), and an account of " International and Important Congresses, Committees, and Societies " for the years 1934 and 1935 (pp. 41–75).

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* " John Briquet (1870-1931)," by Violette Crumière-Briquet. Phanérogamie : Museum National d'Histoire Naturelle, 57 rue Cuvier, Paris (Ve). Price 10 fr. Francais.

† " Chronica Botanica Vol." I. Edited by Fr. Verdoorn, Editorial and Publishing Office, P.O. Box 8, Leiden, Holland, 1935. Pp. 447, and numerous portraits and illustrations in text. Price 15 guilders.

The greater part of the volume (pp. 76–333) consists of a " Review of all Branches of Plant Science during 1934." This contains all the scientific and personal news which the editor, Dr. Verdoorn, collected until the end of January, 1935, and is stated to be at the same time " an exhaustive and up-to-date address list of all Institutions and Societies." Among the illustrations accompanying this section are reproductions of photographs of *Cytinus hypocistis* as grown in the Botanic Garden, Innsbruck, and of *Rubus arcticus* cultivated in the Botanic Garden, Tartu, besides many portraits of deceased and other botanists, and views of new buildings such as that of the Fan Memorial Institute of Biology, Peiping. Among noteworthy illustrations are those of the replica of Clusius' garden in the University Botanic Garden, Leiden, and a view in upper Tshilik (U.S.S.R.).

The most important feature of the third section is the list of " New and Changed Addresses " (pp. 345–378), which forms an indispensible Supplement to the International Address book of Botanists. This appears to be very up-to-date. The few pages (334–342) devoted to " Correspondence " are distinctly stimulating, and this feature might with advantage be enlarged —but that depends on the energy and ability of correspondents. The " Chronica " certainly forms an ideal medium for the ventilation of a legitimate botanical grievance, since it reaches most of the botanists who are in a position to redress it.

The enormous amount of work required for the preparation of the volume can be appreciated only as a result of extended study of its contents. According to an editorial statement, there are nearly 4,000 institutions of pure and applied botany, between 60,000 and 70,000 botanists, and about 1,000 periodicals concerned with botany. In the interests of the science it is to be hoped that botanists generally will give adequate support to the " Chronica Botanica " which is the first modern periodical to give a record of current activity in all branches of botany.

T. A. SPRAGUE.

The Cool Greenhouse.*—In this volume the author describes cultural methods for growing as annuals a great variety of plants that can be used by amateurs to stock a cool greenhouse throughout the year. The directions given are based largely on the experience of Mr. Sutton's head gardener, Mr. F. Townsend, during a quarter of a century in the service of the former's father, the late Mr. Leonard Sutton.

Much space is devoted to South African species such as *Dimorphotheca*, *Gazania*, *Arctotis*, *Ursinia*, and their recent hybrids. One of the most useful features is the concluding reference table, giving the time of sowing and of flowering, and the height of the

* By L. N. Sutton. Putnam, London, 1935. Pp. xii+186, figs. 34. Price 5/-.

species dealt with. Mr. Sutton's book, which is illustrated by photographs of views in his own greenhouses, should prove of great value to both amateur and professional gardeners.

Wild Flowers of Newfoundland.*—This work is being published in five parts, each of pocket size, and is described by the author as being " the first attempt to publish part of an illustrated collection of the Wild Flowers of Newfoundland."

The arrangement follows Gray's Manual, and part 3, the first to be published, contains over 200 illustrations, " mainly orchis, willow, buttercup, mustard and rose." A number of species not illustrated is mentioned, often with no description. The addition of diagnostic characters in these cases would have added considerably to the value of the book.

The nomenclature is on the whole satisfactory, and the volume will no doubt be appreciated by amateur botanists in Newfoundland.

Lilies, their Culture and Management.†—This work is the joint production of an enthusiastic and erudite amateur and of a cultivator of mature experience, assisted, as the preface indicates, by the advice and help of experts in special subjects. The volume is divided into two parts. The first deals with the structure of lilies, their propagation, cultural requirements, hybridisation and diseases, while the second is mainly devoted to a lengthy chapter entitled " Lilies of the World," this being an account of all known species, varieties and hybrids, arranged alphabetically.

The first part, designed primarily for garden lovers, gives up-to-date information on the respective subjects and is assured of a warm welcome. The second provides a most useful descriptive list, the wide range covered giving it an unique place in the literature of the genus. After each species there are supplied details of its distinguishing features, its history, and geographical distribution ; frequently also other information is given which has been drawn from volumes not readily accessible to the layman. The nomenclature has been revised and carefully worked out according to the International Rules. Important name-changes are, however, few. The bibliography provided at the end is of particular value, especially with regard to the early history of the genus, but fuller references to the literature in the body of the work would have rendered it even more useful from the botanical standpoint.

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* By A. M. Ayre. Published privately by A. M. Ayre, St. John's ,Newfoundland. Agents : L. Reeve & Co., Ltd., Ashford, Kent, 1935. Pp. 231, illustrations 231. Price .

† " Lilies, Their Culture and Management." By H. Drysdale Woodcock, K.C. and J. Coutts (Curator, Royal Botanic Gardens, Kew). 8vo. xv+242 pp., 130 illustrations. Country Life Limited. London. 1935. Price 15/- net.

Although, as its title indicates, the book does not purport to be a systematic treatise, it will form a very valuable reference work for the botanist as well as the horticulturist, and we congratulate the authors on the successful production of a volume which will be a stand-by to lily cultivators for many years to come. The work is well-produced, moderately priced, and illustrated by a large number of excellent photographs.

A Pocket Flower Book.*—This small volume should be of use to those wishing to obtain an introduction to the taxonomy of British seed plants. It is illustrated by 501 coloured figures, the majority by the late Miss Trower, and 28 (grasses) in black and white. Most of the reproductions are recognisable likenesses of the species they represent and many of the original paintings must be charming pictures. Several, such as that of the Grass-of-Parnassus (169), might well have been re-drawn. The colour (as reproduced) does not always give a happy impression. A blurred effect is probably unavoidable except at a cost which would have increased the price of the book very greatly. It is, however, unfortunate that the petals of the greater stitchwort appear as pale violet-purple and those of the meadow crane's bill as dark purple. The value of the figures to the beginners would have been increased had the degree of reduction been indicated.

The accompanying text seems adequate for its purpose. The descriptions are concise and many useful details are given concerning morphology, pollination, and habitats.

This book is confessedly not one for the expert. Many well-known British species are neither described nor mentioned. There is, therefore, a possible danger in its use by a beginner—that a specimen may be wrongly named by attaching to it the name which fits most nearly of those plants figured and described in the book. The reader is certainly warned on this point in the introductory chapter but the simple device of listing under each genus the species not dealt with more fully would have been a much better safeguard.

W. B. TURRILL.

Diseases of the Banana.†—The author states in his preface that this work is intended to provide useful information for the practical agriculturalist, the student, and the scientific investigator. Actually it is likely to appeal most to the last two of these cate-

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* "A Flower Book for the Pocket," by Macgregor Skene. Illustrations by Charlotte Georgiana Trower and Ruth Weston. Oxford University Press, 1935, pp. 380. ill. 529. Price 7s. 6d. net.

† "Diseases of the Banana and of the Manila Hemp Plant," by C. W. Wardlaw. Macmillan and Co., Ltd., 1935. Pp. xii and 615, 292 text figures, 3 graphs. Price 30/- net.

gories. The book is an exhaustive compilation of existing knowledge as to the diseases of the banana and the Manila hemp plant, including troubles of transport and storage. After a short introduction describing methods of banana cultivation, the body of the work is divided into four sections, namely (1) Soil-borne, Vascular and Stem Diseases, (2) Plantation Diseases of Fruit and Leaf Diseases, (3) Virus Diseases and (4) Storage Diseases. Previous papers by the author and his colleagues are largely drawn upon, especially in the chapters dealing with Banana Wilt (Panama Disease), Bacterial Diseases of the Banana, and Transport and Storage problems. It is very useful to the investigator to have all these observations and experiments collected together, but the very detailed treatment is hardly such as will appeal to the average practical agriculturalist. In addition to first-hand information on the diseases investigated by the author, there are provided shorter accounts of all recorded diseases, whether due to fungi, viruses, or physiological causes. One disease, a *Dothiorella* rot of the fruit, is described for the first time, from information supplied by workers in Palestine. Occasionally the treatment is a little uncritical, as for instance in the account on pp. 160-161 of Elephantiasis or " Suriname Disease," where no indication is given to the reader that Essed's genus *Ustilaginoidella* is discredited by mycologists, and in fact was never properly described.

At the end of the book are four appendixes, the first of which is a useful list of fungi and bacteria which have been recorded in association with the banana, with references. The other three deal respectively with strains of *Fusarium cubense*, figures as to imports of bananas into Great Britain, and conditions on shipboard. A bibliography of 559 titles and an index complete the volume. The format is similar to that of other works on tropical agriculture issued by the same publishers.

Dr. Wardlaw's book represents an immense amount of labour, both original experimental work and critical scrutiny of literature, and will for long be a standard work of reference for those who have to deal with this tropical crop.

E. M. WAKEFIELD.

Field Studies in Ecology.*—This volume aims to provide, by a first-hand study of British vegetation, an introduction to the principles of ecology. It is based on the experiences of the author while conducting classes in plant ecology at Bristol University, and should prove of value to teachers wishing to organise similar courses elsewhere.

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* By R. Bracher, M.Sc., Ph.D. J. W. Arrowsmith, Ltd., Bristol, 1934. Pp. 100. Figs. 10. Price 2s. 6d.

Transvaal Veld Flowers.*—The number of popular books on the botany of South Africa, and of the Transvaal in particular, is very small. Miss Verdoorn's little volume, therefore, should find a ready public.

A selection of the more conspicuous Transvaal plants is described under such headings as " November in the Middleveld," " When the grass is Long," and "A harbinger of Spring," and there is a number of illustrations by Miss Letty. Thirty-six of its eighty-two pages are devoted to an " Introduction to Botany," which might well have been omitted altogether in a work of this character, thus allowing space for the decription of a greater number of species. The information given can be found in most elementary text-books.

We hope that the study of the native flora will be stimulated by the publication of this volume and that the author and artist will be encouraged to give us further work on the same lines.

Garden Flowers in Color.†—This volume consists of a collection of coloured illustrations taken from nurserymen's catalogues and similar publications, accompanied by a text giving a brief description of each plant, together with hints on cultivation.

The illustrations form the main feature of the book and cover a wide range of garden subjects. As might be expected from their source, they vary much in quality. The best, such as those of tulip varieties, are very striking examples of colour reproduction work. The text will be useful to beginners, though the style is often as highly coloured as the illustrations. The term " bulbous plant " is used in its widest sense, to include true bulbs, corms, tuberous roots and rhizomes.

Weeds.‡—Weeds have always been a bane of the gardener and agriculturalist. In recent years much effort has been directed towards the discovery of efficient methods of weed control, but records of the results are scattered through the literature. Professor Muenscher in his book aims " to make more available the information on the identification and control of weeds." The book has two parts, the first dealing with the dissemination, reproduction and control of weeds, with lists of the weeds of special habitats, while the second is a descriptive flora of 500 of the common weeds of the northern parts of the United States.

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* " An Introduction to Botany and to a few Transvaal Veld Flowers," by I. C. Verdoorn. Speciality Press of S. Africa, Ltd., Wynberg, Cape, South Africa. Price 2/6 net.

† By G. A. Stevens, New York. The Macmillan Company, 1934. Pp. 320. Profusely illustrated in colour. Price 16s.

‡ By Walter Conrad Muenscher, assistant professor of Botany, New York State College of Agriculture at Cornell University, Ithaca, New York. The Macmillan Co., New York. 1935. Pp. xxii + 577. Price 25s.

A large proportion of the weeds listed for lawns, meadows and cornfields are common to this country, but few of our weeds are to be found in the cranberry bogs or rice fields. An analysis of origins of the weeds is of great interest. Only 39·2 per cent. are natives of the United States and of the remainder 35·4 per cent. are European and 13·2 Eurasian. No doubt the weeds of the Old World were introduced frequently with the seeds of crop plants. Some of the native American weeds occur sporadically in this country and as many of the remainder are now cosmopolitan, the sphere of usefulness of the book is not confined to the United States.

An artificial key occupying 36 pages simplifies the work of identifying a weed and though technical terms are used throughout, reference to the glossary should ease the difficulties of the layman. The descriptions of species are arranged alphabetically under families. In general they are adequate, but the descriptions of the species *Orobanche* might well be amplified. Suitable methods of eradication are indicated in each case by references to the chapters on mechanical and chemical methods of weed control, where the information given is usually sufficient for practical application. The value of the work is enhanced by 132 pages of accurate line drawings and a good bibliography.

R. MELVILLE.

A Flora of Assam.*—We welcome the first part of this long-awaited Flora. It is certainly time that the present knowledge of the botany of this Province should be brought together. The Flora is the work of three successive authors, all three being members of the Indian Forest Service, so that one more is added to the list of important botanical works executed by officers of that service. In the introduction acknowledgment is made to the many botanists and collectors who have contributed to our knowledge of the plants of the area, though no mention is made of Captain Kingdon Ward.

In the introduction Mr. Das states, " Some herbaceous plants have been included, which are beyond the real scope of this work ... " and, again, the last paragraph of the preface reads, " Monocotyledons will, it is presumed, be an entirely separate publication." In these circumstances, some qualifying epithet should have been added to the title of the work ; as it stands, one is entitled to expect a complete account of at least all the flowering plants of Assam.

It is to be regretted that the nomenclature is not up-to-date. For example, the genus *Unona* L. (p. 33) is retained though Safford has shown that *Desmos* Lour. is correct for the oriental species ; *Ternstroemiaceae* (p. 115) should be *Theaceae* and *Camellia theifera* Griff. (p. 122) *Thea sinensis* L.; *Bombax malabaricum* DC. is more correctly *Gossampinus malabarica* (DC.) Alston. The genus *Sterculia* in its broadest sense has been retained and not split, in conformity

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* By U. N. Kanjilal, P. C. Kanjilal and A. Das. Vol. I (Pt. 1). The Prabasi Press, Calcutta, 1935. Pp. lxxi + 184. Cloth, Price 8 Rs.

with modern practice, into *Sterculia* L., *Erythropsis* Lindl., and *Pterygota* Endl. *Taraktogenos* has been sunk in the genus *Hydnocarpus* (p. 87) though there are quite adequate reasons for keeping the two distinct. It is not understood why some species have been treated differently and, though described, are not found in the specific key, nor numbered, e.g. *Sterculia khasiana* Debb. (p. 154).

It is not stated whether a key to the families is proposed ; it would be a useful addition.

Apart from the above not very serious blemishes, this important work has been well executed and the authors, the last of whom is also its editor, are to be heartily congratulated. The introductory pages include an ecological sketch, the work of the late Mr. U. N. Kanjilal ; a rather full account of the geology of the area ; a note on climate ; a synopsis of the families ; and an ample glossary of botanical terms. The botanical part includes the families from the *Ranunculaceae* to the *Elaeocarpaceae*, following, with some exceptions, the " Genera Plantarum " of Bentham and Hooker.

The keys to the genera and species seem to be adequate and workable. The printing, binding and style is good, and the size quite handy for consultation in the field.

C. E. C. FISCHER.

Botanical Magazine.—Part 3 of volume 158 was published on July 29th, 1935, and contains the following figures : *Sorbus Esserteauiana* Koehne (t. 9403), a fine scarlet-berried species from Western Szechwan ; *Dicranostigma Franchetianum* (Prain) Fedde (t. 9404), also from Szechwan and N.W. Yunnan ; *Aquilegia grata* Maly ex Zimmeter (t. 9405), an interesting mauve-violet and white-flowered species from the Balkan Peninsula ; *Vagaria parviflora* Herbert (t. 9406), formerly placed under *Pancratium*, with white flowers produced in the autumn, a native of Syria and N. Palestine ; *Rhododendron campylogynum* Franch. (t. 9407A), from N.W. Yunnan and N.E. Upper Burma ; *R. vaccinioides* Hook. f. (t. 9407B), another diminutive species found in the Sikkim Himalaya and in N. Burma ; *Bulbophyllum elassonotum* Summerhayes (t. 9408), a new species, allied to *B. cupreum* Lindl., with orange flowers with reddish spots and an orange or brick-red labellum, a native of Assam ; *Buddleja auriculata* Benth. (t. 9409), a pleasantly scented species with orange-throated white flowers, widespread in South Africa ; *Primula amethystina* Franch., subsp. *brevifolia* Forrest (t. 9410), with bluish-mauve flowers, from W. China and S.E. Tibet ; *Eucryphia Moorei* F. Muell. (t. 9411), from New South Wales and Eastern Victoria ; *Rhodohypoxis Baurii* (Baker) Nel (t. 9412), a native of Natal and Eastern Cape Province, bearing either pink or white flowers, and *Enkianthus chinensis* Franchet (t. 9413), one of the most beautiful of the genus, found in E. Szechwan and extending to N.E. Upper Burma.

East African Agricultural Journal.—The East African Agricultural Journal of Kenya, Tanganyika, Uganda and Zanzibar makes its appearance with the issue of July, 1935, and hereafter will be published at intervals of two months. The annual subscription is 5s. post free, payable to the Government Printer, P.O. Box 128, Nairobi, Kenya Colony. The Journal is edited by Mr. W. Nowell, C.B.E., the Director of the East African Agricultural Research Station, Amani, and the Editorial Board consists of the Directors of Agriculture in Kenya, Tanganyika, Uganda and Zanzibar.

One of the greatest problems which faces any Director of Agriculture is how to bring to the notice of the farming community the results of the work which is being done by his Department. Administration reports are not the place for this. They are mainly intended to show Government how the expenditure incurred has been utilised and to give figures which will indicate how the work of the Department has added to the wealth of the country. Leaflets and bulletins are certainly of use but have only a limited circulation. A semi-official journal issued at regular intervals, therefore, if the subjects dealt with are written in a popular manner, should appeal to a wide public, not only over the whole of East Africa, but elsewhere in the world where similar climatic conditions prevail.

The first issue comprises eighty-nine pages. The articles contained in it are, with one or two exceptions, written by officers of the Agricultural Departments concerned, and one can feel that the authors have an intimate knowledge of their subject. Many of the articles deal with the important export and commercial crops of East Africa but others are of more general interest and include subjects such as soil erosion, overstocking, virus diseases, climate and weather.

If this Journal can maintain the high standard set by its first issue, it should have a wide and appreciative circulation, and if it leads to a better understanding of the activities of the Agricultural Departments of East Africa it will serve a most useful purpose. One would like to see articles written by private individuals, and it is hoped that these will come in time ; but one realises that the settler in East Africa seldom has the time, even if he has the inclination, to put down on paper his experiences in any particular aspect of farming.

South African Timber Trees.*—This work represents part three of " Forest Trees and Timbers of the British Empire," the first parts of which have already been noticed (K.B. 1932, 256, and 1934, 140). In the present number, which has been continued along the same general lines as the first two, there are descriptions

* " Fifteen South African High Forest Timber Trees," by L. Chalk, M.A. D. Phil., M.M. Chattaway, B.Sc., M.A., J. Burtt Davy, M.A., Ph.D., F. S. Laughton, B.Sc., and M. H. Scott, B.Sc., Oxford, at the Clarendon Press, 1935.

of fifteen species which flourish in " the relatively moist strip of country along the south and east coasts (of S. Africa) lying between the sea and the upper slopes of the principal ranges of mountains running roughly parallel to those coasts." The species were selected by Mr. J. J. Kotzé, Chief of Forest Research at Pretoria, who also arranged for the necessary material to be supplied. Information concerning natural regeneration and silviculture was sent by Mr. F. S. Laughton of Knysna, while details concerning " sawing and seasoning " and " working qualities," contributed by Mr. M. H. Scott of Pretoria, are recorded more fully than in previous parts. Various changes have been made in the mode of presentation of the anatomical descriptions. Of these the most important is that details concerning the dimensions of the vessel elements have been omitted under the individual species, and have been expressed instead in a new and ingenious tabular form in an appendix. Alterations in the technique of making and recording measurements have also been made along lines which recent research has shown to be desirable. While these new methods probably yield more satisfactory data than were obtained previously, it is to be hoped that as few changes as possible will be made in the preparation of future parts, as inconsistency of treatment will make it difficult to use the whole work to the best advantage when it has been completed. This applies also to the use of descriptive terms, some of which have likewise been slightly changed, e.g. the constituent cells of a vessel were termed " vessel segments " in part 1, " vessel elements " in part 2, and " vessel members " in part 3. These changes have doubtless been made in order to make use of the " Glossary of Terms used in describing woods " recently drawn up by a special committee of the " International Association of Wood Anatomists," and it is to be hoped that further alterations will not be necessary. The high standard of the work as a whole has been well maintained, and the present number is especially useful owing to the difficulty in obtaining accurately-named specimens of the wood of the species described.

C. R. METCALFE.

The Woody Plants of Natal and Zululand.*—In the Kew Bulletin for 1932, 158, the excellent work of Dr. J. S. Henkel on types of vegetation in Southern Rhodesia was commented upon, and we are now pleased to note another very useful contribution to botany by the same author. Having retired from the Rhodesian forest service, he has turned his attention to the ligneous vegetation of Natal, and has produced a most useful book in key-form based on field experience during the last twenty years.

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* By J. S. Henkel, D.Sc., F.R.S.S.Afr. Published for the Natal University Development Fund Committee, Durban and Pietermaritzburg, by Robinson & Co., Ltd., Mercury Lane, Durban. 252pp. (1934).

Dr. Henkel's key is constructed almost entirely from vegetative characters, in order that most of the trees and shrubs of Natal may be determined in the absence of flowers, and, so far as we have been able to test it, the key has worked extremely well. On leaf and stipule characters alone the species are ingeniously arranged into 29 artificial groups, and each group is trichotomously divided in nearly every case into *trees*, *shrubs* and *climbers*. Confirmation of a determination may be further checked by the provision of short general descriptions, in which, though excellent in other respects, there is rarely any mention of flowers or inflorescence or their position on the plant. This is much to be regretted, and is the only criticism we need make of a most original and useful book which may lead the beginner on to deeper studies of the rich and varied flora of Natal.

J. HUTCHINSON.

Coleus barbatus Benth.* ADDENDA ET CORRIGENDA.—Since the paper on *Coleus barbatus* Benth. was published, additional facts have come to light, requiring certain modifications.

(1) It appears that the combination "*Ocymum* α *Zatarhendi*" published in Forssk. Fl. Aegypt.-Arab. 109 (1775) was intended by Forsskaal as a new binary name for the species which he had previously listed on p. CXV *without description*, as "*Ocymum aegyptiac.*"

The letter "α" indicates that the plant described was typical *Ocymum Zatarhendi*. The next number described, namely "34 *Ocymum* β *Zatarhendi*?", was regarded by him as possibly being a variety of *O. Zatarhendi*, although he had previously listed it without description (see p. CXV) as a distinct species under the name *Ocymum villosum*. Forsskaal appears to have placed the varietal letters α, β, etc. *in front of* the specific epithet in cases where he did not supply varietal epithets, thus on p. 9 he has no. 24 *Dianthera* α *americana* and no. 25 *Dianthera* β *americana*, the latter followed by the remark, "Prioris an varietas, vel species diversa?"

It follows that the valid name under International Rules is *Plectranthus Zatarhendi* (Forssk.) E. A. Bruce, comb. nov., since the name *Ocymum aegyptiacum* was not validly published: it was unaccompanied by a description, and was rejected by Forsskaal when he supplied one. It accordingly has the status of a name published in synoymy.

The synonymy of the species concerned is as follows:—

Plectranthus Zatarhendi (*Forssk.*) *E. A. Bruce*, comb. nov.
Ocymum Zatarhendi var. α Forssk. Fl. Aegypt.-Arab. 109 (1775).
Ocymum aegyptiacum Forssk. l.c. p. CXV, sine descr.
Plectranthus Forskalaei Vahl Symb. **1**, 44 (1790) excl. syn.
Coleus Zatarhendi (Forssk.) Benth. Lab. Gen. et Sp. 50 (1832).
Plectranthus aegyptiacus C. Chr. in Dansk Bot. Arkiv, **4**, no. 3, 21 (1922).

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*Continued from Kew Bulletin, 1935, 324.

(2) The combination *Plectranthus villosus* (Forssk.) was erroneously attributed in Kew Bull. 1935, 324, to Carl Christensen, who actually listed the species concerned under the name *Ocimum villosum* Forssk., while suggesting that it might perhaps be the same as *Coleus aromaticus* (Roxb.) Benth. or at least very nearly related to it (Dansk Bot. Arkiv, **4**, no. 3, 21 : 1922).

The synonymy of the species is accordingly as follows :—

Plectranthus arabicus *E. A. Bruce* in Kew Bull. 1935, 324.
Ocymum villosum Forssk. Fl. Aegypt.-Arab. p. CXV (1775), sine descr.
Ocymum Zatarhendi ? var. β Forssk. l.c. 110.
Plectranthus villosus (Forssk.) E. A. Bruce l.c.

Christensen (l.c.) remarks that " the name Zatarhendi is not as several authors remark a specific but a generic one." Actually Forsskaal suggested (p. CXV) that *Ocymum aegyptiacum*, *O. villosum* and *O. vaalae* might be regarded as constituting a new genus under the name *Zatarhendi*, but when he came to describe these three species (pp. 109–111) he retained them in *Ocymum* and adopted the name *Zatarhendi* as a specific epithet for the species which he had previously called *O. aegyptiacum* (see above.)

E. A. BRUCE.

The Phylogeny of Zea Mays.* During the past twenty years Professor Weatherwax has published a series of papers giving the results of his researches on various aspects connected with the study of maize or Indian corn (*Zea Mays*). Although much has been written on the phylogeny of this very important cereal, his present comprehensive and critical account is justified by the accumulation of new information both regarding maize and its ally, teosinte (*Euchlaena mexicana*). The following is a summary of his conclusions on this much-discussed problem.

It is pointed out that our first trustworthy accounts of maize by the Spanish explorers of Mexico and Peru and by the earliest English colonists in North America indicate that it was then, as now, the same highly specialized plant and completely dependent upon man for its existence. The author takes into consideration all possible sources of evidence which might conceivably throw light on its ancestry, such as Indian myth and legend, work of archæologists and explorers, palæontology, and the botanical characteristics of maize ; but he particularly emphasizes the value of evidence derived from a study of the plant and its near relatives.

The evidence from historical sources as to its origin is very meagre. It is probable that Indian races had stories concerning the commencement of maize agriculture, which in handing on from one generation to another would undergo modification, so that if in the beginning they had any foundation, such had disappeared before the coming of the white man. The earliest Indian manuscripts of the sixteenth century dealing with maize culture prove

* By Paul Weatherwax. Thd American Midland Naturalist, **16**, 1-71 (Jan. 1935).

to be only an account of its introduction in its modern form from a nearby region. Increased interest in recent years in archæological exploration, however, may assist in some way in solving the problem.

The geological record as far as maize is concerned is almost a blank. Mention is made of Darwin's discovery of fossilized remains on an island off the coast of Peru and an explanation is put forward why these may not be of extreme age. The supposed fossil from Peru described by Knowlton has been shown to be an artifact made of clay and partially baked, whilst another supposed fossil found in Georgia turns out to be a cluster of hexagonal crystals arranged around an elongated axis.

There have been recurring reports of the discovery of wild maize. In parts of Mexico, teosinte, or natural hybrids of maize and teosinte have been sometimes stated to be the source of maize. The most recent report of wild maize is from Guatemala, where there is said to be a wild plant the small ears of which have the flavour of maize and are used as food. Without further corroboration Weatherwax does not feel justified in assuming this plant to be closely connected with maize ; he considers, however, that the locality is one in which wild maize might well occur.

The tribe *Maydeae* to which maize belongs, may be geographically divided into two groups ; one in the Eastern Hemisphere which the author considers can be safely disregarded in considering the ancestry of maize ; the other confined to America, contains maize, teosinte and *Tripsacum*. Teosinte is no doubt the nearest known relative of maize, whereas *Tripsacum* does not seem to have a very close affinity with it. The resemblance between some members of the *Rottboellieae* and *Tripsacum* is indicated and a suggestion is made that a study of the American genera of this subtribe would be a basis for further phylogenetic studies.

Cytological research has shown that in maize the diploid chromosome number is typically 20, while in the annual and perennial species of *Euchlaena* the numbers are 20 and 40 respectively. In *Tripsacum* the diploid number is 72, except in one variety of *T. dactyloides* in which it is 36. These figures are not thought to provide much help as to the course of evolution in the American *Maydeae*. It is interesting to note, however, that Avdulov gives the basic (haploid) number as 9 in *Rottboellia* (*Rottboellieae*) which serves further to strengthen the suggestion of a relationship to *Tripsacum*. Evidence of close affinity amongst the American *Maydeae* is shown by the ability of the different members to intercross. Maize and annual teosinte hybridize readily and the offspring, being fertile, is strongly suggestive of a common origin. Maize and perennial teosinte have been intercrossed but the hybrids exhibit a much lower degree of fertility. Hybrids have also been produced between maize and *Tripsacum*, but none between the latter and any of the *Rottboellieae*.

The vegetative morphology and the construction of the inflorescence and spikelets of all the above genera are discussed and compared with those of maize. It is suggested that the 2-flowered condition of the male spikelets of the *Maydeae* and of the female spikelets of some varieties of maize represent a permanent reversion to an earlier condition rather than the retention of a primitive character ; and further that the branch of the *Andropogoneae* from which the above genera have been derived, separated into two parts, one leading towards monoecism and forming the *Maydeae* and the other producing the *Rottboellieae*.

Certain significant features associated with various types of ears of maize are described. The typical ear has the grain arranged in 8 or more parallel longitudinal rows, the rows being grouped in pairs because the spikelets are in pairs. By extreme starvation it has been possible to reduce an ear almost to vanishing point, but even in such cases both female spikelets of a pair remain. This persistent retention of both spikelets in the female inflorescence distinguishes maize from the remainder of the American *Maydeae*. In some varieties the grains do not appear in rows. This apparent irregularity is due to the lower flower of each spikelet occasionally producing a grain and so breaking up the linear arrangement. Another type of irregularity is seen where the spikelets are grouped in triads, another character found in no other member of the American *Maydeae*. It is suggested that the ear has evolved from an inflorescence built up on the distichous plan. The author does not think it could have been derived from a loose panicle by the shortening of the branches until each was reduced to a pair of spikelets, as, although this might satisfactorily explain the origin of the pairs of spikelets, it gives no clue as to why they should be arranged in many, instead of two rows. The most widely accepted theory of the origin of the ear is by the fusion side by side of a number of 2-rowed spikes or racemes. This is shown to be plausible, as in the ear each two rows are often separated by an apparent line of fusion, whilst if the cob is subjected to pressure, it often splits along these lines. This theory, however, is not acceptable to the author who points out that spikes, like those of *Tripsacum* and *Euchlaena*, could not fuse to form an ear of maize unless the aborted spikelets became functional. In addition he has been unable to detect in the internal structure any evidence of fusion. It is shown that not only are the rows of spikelets arranged in a linear manner, but that there is also a lateral relationship between the spikelets, and by plotting the positions of pairs of spikelets they fall into a system of spirals ; this is further evidence against the fusion theory.

The resemblance between maize and teosinte, their genetic compatibility, and apparent overlapping distribution, indicate that they have shared a common heritage. It has frequently been suggested that teosinte is the wild form of maize but Weatherwax's objection to this is that both plants are highly specialized, each in

some way more than the other. Teosinte differs from maize in possessing a hardened articulate rhachis and in the outer glume covering the grain. The author considers that the ancestor of maize separated much earlier from the same stock as the *Andropogoneae* and pursued its own course of evolution in complete isolation from teosinte. The theory of hybrid origin of maize through the crossing of some unknown grass with teosinte has been the subject of much discussion, but this is likewise not favoured by Weatherwax. Having reviewed and found unacceptable all other means of origin, the author gives a description of a hypothetical wild maize from which the cultivated plant might be derived. It was probably perennial by means of basal offshoots or rhizomes, had tall branched stems and great diversity in the degree and manner of development of the inflorescences. Those terminating the main stems had a strong tendency to be wholly staminate whilst those placed lower down on the plant and terminating short branches tended to be pistillate. It is suggested that this wild plant had large grains which were more or less produced beyond the bracts. The possible extinction of such a plant would be due to its being poorly fitted to living under natural conditions and its preservation in its present state to its adoption by man at a critical stage in its life's history. The author, however, thinks it not unlikely that in some isolated well-protected locality in Tropical America the wild plant may still be growing.

C. E. HUBBARD.

Edgar Thurston.—Mr. E. Thurston, C.I.E., died suddenly at Penzance on the fifth of October at the age of 80. He was the second son of Charles Bosworth Thurston of Kew. After leaving Eton he qualified as L.R.C.P. from King's College, London, and in 1885 was appointed Superintendent of the Government Museum, Madras, and held the position for a long period. During his stay in India he devoted much time to anthropological and ethnographic studies. The results of these were published in his works "Ethnographical Notes in Southern India" and "Castes and Tribes of Southern India," the latter in seven volumes. A later volume bore the title "Omens and Superstitions of Southern India." He received the Kaisar-i-Hind gold medal in 1902 and was made a C.I.E. in 1909.

After his retirement, Thurston lived chiefly in Cornwall, especially in Penzance, and devoted most of his time to a study of the flora of the county. In 1922 he published a Supplement to F. Hamilton-Davey's Flora of Cornwall (reprinted from the Journal of the Royal Institution of Cornwall, vol. 21). This was followed by seven papers (1923-29), every one under the title "Note on the Cornish Flora," and all but the last in collaboration with D. C. C. Vigurs. In 1929 he was awarded the Henwood Gold Medal for his researches on the British and alien plants of Cornwall. In 1930 he

published " British and Foreign Trees and Shrubs in Cornwall." This interesting book forms a useful introduction to the gardens and to the woody flora (native and introduced) of the county. It is illustrated with 42 photographic plates, many of which excellently represent the habit of the species.

In March 1919, Thurston presented his Cornish Herbarium to the Royal Botanic Gardens, Kew. To this valuable collection he has added large numbers of new specimens from year to year, making it a most complete county herbarium. The specimens were mounted by himself on stiff paper sheets, the standard size of the Kew Herbarium. Most of them are well collected and carefully prepared. At his request the collection has been kept as a unit during his lifetime.

Not only has Kew lost by Edgar Thurston's death a valued friend and generous donor, but many members of the staff feel, as individuals, the loss of his jovial personality and his ever youthful outlook on life.

W. B. TURRILL.

Fergusson Escombe.—We record with regret the sudden death of Mr. F. Escombe on October 12th. When the late Dr. Horace Brown, F.R.S. (see K.B. 1925, 96) was carrying out his important physiological researches in the Jodrell Laboratory during the years 1897–1901, Mr. Escombe was working with him and a series of papers was published in the " Philosophical Transactions of the Royal Society " under their joint names. These papers dealt with the influence of very low temperatures on the germinative power of seeds; the depletion of the endosperm of *Hordeum vulgare* during germination; the influence of varying amounts of carbon-dioxide on photosynthesis; and some physical laws of diffusion of gases and liquids in relation to the assimilation of carbon and translocation in plants. (See K. B. 1898, 62; 1901, 203, 204; 1902, 24; 1905, 71.) Mr. Escombe also carried out some research work in the Laboratory in 1910.

Flora of Niagara.—The area covered by the volume under review* is the region within a radius of about 50 miles from the city of Buffalo, N.Y., thus including the north-western part of New York State, and a portion of the adjacent Province of Ontario, Canada, lying between Lakes Erie and Ontario. " The consolidated rocks of the region are all of sedimentary origin, having been deposited in the Paleozoic seas that encroached upon the

* Flora of the Niagara Frontier Region; Ferns and Flowering Plants of Buffalo, N.Y., and Vicinity. By Charles A. Zenkert, Research Associate in Botany, Buffalo Museum of Science.—Bulletin of the Buffalo Society of Natural Science, vol. XVI. Buffalo, N.Y., August, 1934. 8vo. x + 328 pp., 69 illustrations, 1 map. Price 2 dollars.

interior of the continent in Silurian, Devonian and Carboniferous times." The whole of the area was subjected to glaciation during the great Ice Age, and the origin of the Great Lakes is attributed to the damming of the glacial and other waters by the moraines left behind by the retreating ice front. Lakes Erie and Ontario are the dwindled successors of a series of much larger glacial lakes, and the southern beach of glacial Lake Iroquois, the ancient predecessor of Lake Ontario, has served as a ready-made road-bed for the Ridge Road that runs eastward from Lewiston to Rochester.

From Lake Ontario, 246 feet above sea-level, a gently sloping plain extends southwards for seven miles to the base of the Niagara escarpment, a limestone formation that rises rather abruptly to a height of 200 feet above the Ontario plain. Proceeding southward, this is succeeded by the Huron plain (about 600 feet) and the Onondaga escarpment, a second but lower limestone cliff. Beyond this stretches the Erie plain (600-900 feet), bounded on the south by the Portage escarpment, which forms the northern fringe of the great Alleghany plateau, the north-western part of which lies within the area of the Niagara region flora.

" The physiographic setting of the region is such as to exhibit an appreciable range of climatic values and a rather marked reversal in the zonal distribution of vegetation—northern plants thriving in the southern uplands and southern forms being at home in the northern lowlands." It has long been known that the region of the Great Lakes enjoys a mild, almost oceanic, climate, and the northern part of the Niagara area accordingly contains a large Austral element, including such characteristic trees and shrubs as *Celtis occidentalis, Morus rubra, Magnolia acuminata, Liriodendron Tulipifera, Asimina triloba, Sassafras officinale, Ptelea trifoliata, Ceanothus americanus, Aralia spinosa* and *Nyssa sylvatica.* Among herbaceous plants of Austral type are *Lilium philadelphicum, Erythronium albidum, Disporum lanuginosum, Comandra umbellata, Cimicifuga racemosa, Actaea alba, Hydrastis canadensis, Anemonella thalictroides, Chimaphila maculata, Asclepias tuberosa, A. phytolaccoides, Polemonium reptans, Mertensia virginica, Lithospermum Gmelini* and *Onosmodium hispidissimum.*

On the other hand many boreal types, including various glacial relicts, are found in the southern part of the region, in the glaciated area of the Alleghanian plateau north of Salamanca : among them are *Myrica Gale, Ledum groenlandicum, Kalmia polifolia, Chamaedaphne calyculata, Andromeda glaucophylla, Vaccinium Oxycoccos* and *Rynchospora alba.*

Evidence for a westward migration of the Atlantic coastal plain flora along the shores of the glacial lakes and their outlets during the last of the Algonquin stage is provided by a list of 15 coastal

plain species recorded from the Niagara region: this includes *Woodwardia virginica, Peltandra virginica, Listera australis, Myrica carolinensis* and *Cakile edentula* var. *lacustris*.

It is difficult to secure reliable information as to the original extent of the deciduous forests in the north-eastern United States, since "there is no one of the vegetational areas of the United States that has been more completely and profoundly altered by man than has this." The appearance of the Niagara region in 1721 was described by Charlevoix in the following words: "Behind those uncultivated and uninhabitable mountains [Niagara escarpment] you enjoy the sight of a rich country, magnificent forests, beautiful and fruitful hills; you breathe the purest air, under the mildest and most temperate climate imaginable, situated between two lakes, the least of which is two hundred and fifty leagues in circuit." As late as 1795 much of the ground that later became the city of Buffalo was "an unbroken wilderness"; the forests in the Erie plain were even then, however, by no means continuous, being broken by large open spaces which seem to have owed their origin, at least in part, to the burning of the drier parts of the forests by the Indians so as to produce fresh and sweet pasturage for the purpose of alluring deer. Owing to clearing of the ground for agriculture, the requirements of the lumber industry, and the demand for firewood and charcoal before coal came into general use, the forests covering in western New York was reduced to one-fourth during the fifty years 1845-1895.

The disappearance of forests has been followed by the usual consequences of shrinkage of watercourses in summer, increased mechanical erosion of the soil, and more important still, its rapid impoverishment by the greatly accelerated removal of mineral salts. "In less than a century agriculture in the Niagara region progressed from the stage of man's conquest of the wilderness to that of a struggle for weed control": out of a total flora (Phanerogams and Pteridophytes) of 1587 species, no fewer than 400 are aliens.

The preceding paragraphs touch on only a few of the points dealt with in Mr. Zenkert's "Flora," the general part of which forms attractive and stimulating reading. Eighteen pages (pp. 5–22) are devoted to the history of the botanical exploration of the area, with which the names of Peter Kalm (1750), François André Michaux (1806), David Douglas (1823) George W. Clinton (during the period 1826-1882) and David F. Day are associated. The account of the Regional Environmental Conditions (pp. 23–67) includes sections on the Topography and Geology, Climatic Factors and Data, Zonal Relations of the Niagara Flora, and Human Agencies and Man-wrought Changes. Then follows the Systematic Account of the Species (pp. 68–274), the general interest of which would have been increased by a brief indication of the geographical distribution of each species. The final section (pp. 275–312), entitled Ecological Areas and Plant Societies, consists of short

sketches of the vegetation of selected areas with lists of prevalent species. The map, pasted inside the back cover, is commendably clear. Mr. Zenkert and the Buffalo Society of Natural Sciences are to be congratulated on the satisfactory completion of their regional " flora," which embodies the results of local botanical research extending over a period of more than fifty years.

T. A. SPRAGUE.

Interpretation of Loureiro's Plants.*—All systematic botanists have experienced from time to time the difficulties of interpreting many of the long-standing species, when authentic specimens are lacking and descriptions are inadequate. Any efforts to throw light on these obscurities and to solve the problems presented are, therefore, most welcome. Dr. E. D. Merrill has earned the gratitude of systematic botanists by the publication of the work now under consideration, which shows evidence of deep knowledge and of long and painstaking research. One is not astonished to learn that the author completed a preliminary study of Loureiro's species so long ago as 1919, and has been engaged on their study ever since. Copies of this preliminary study were sent to various botanical institutions to stimulate further research and the present volume is the outcome of the work of others as well as of Dr. Merrill himself. The competence of the author of " Species Blancoanae " to undertake this research is obvious and the work has been executed in the manner one associates with his name. He has done justice to the labours of other workers in this field and has quoted sixty books and papers in the bibliography.

The difficulty of such research in interpretation is well-known to all who have had to make use of such works as Loureiro's " Flora Cochinchinensis," where the complications are increased by the misinterpretations of the descriptions of earlier authors, especially of Linnaeus.

Of the 1292 species described by Loureiro, 135 have been reduced as duplicating others published in the same work, so that 1157 had to be accounted for. Not all the problems have been solved ; very few, however, are now outstanding, and it is more than doubtful, unless some new discovery of Loureiro's own specimens is made (a very unlikely contingency), that any further elucidation is possible.

C. E. C. FISCHER.

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* A Commentary on Loureiro's " Flora Cochinchinensis " by E. D. Merrill. Transactions of the American Philosophical Society. New series, vol. 24, part 2. June 1935. Published by the Society at Philadelphia. Pp. 445. Price 5 dollars.

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